REPORT RESUMES

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PROCEEDINGS OF THE WEST COAST REGIONAL CONFERENCE ON RESEARCH RELATED TO BLIND AND SEVERELY VISUALLY IMPAIRED CHILDREN (SAN FRANCISCO, MARCH 8-10, 1965).

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THESE PROCEEDINGS WERE PREPARED FROM THE WEST COAST REGIONAL CONFERENCE ON RESEARCH RELATED TO BLIND AND SEVERELY VISUALLY IMPAIRED CHILDREN HELD MARCH 8-10, 1965. SURVEY RESULTS WERE PRESENTED WHICH INDICATED THE NUMBER OF BLIND, SEVERELY VISUALLY IMPAIRED, AND MULTIPLY HANDICAPPED CHILDREN IN CALIFORNIA AND THE INCIDENCE OF BLINDNESS IN CHILDREN IN THE LOS ANGELES AREA. INFORMATION WAS OFFERED ON RESEARCH TECHNIQUES TO UNCOVER THE "HIDDEN" BLIND POPULATION FOR INCLUSION IN SURVEYS. VARIOUS CAUSES AND TREATMENTS OF BLINDNESS IN CHILDREN AND TWO REPORT FORMS USED FOR CHILDREN'S EYE EXAMINATIONS ARE PRESENTED. THE FOLLOWING AREAS ARE EXAMPLES OF CURRENT RESEARCH EMPHASIS--(1) UPDATING BRAILLE READING INSTRUCTION, (2) DEVELOPING AN EDUCATIONAL PROGRAM FOR MULTIPLY HANDICAPPED BLIND CHILDREN, (3) MODIFYING AND EVALUATING THE OHWAKI-KOHS BLOCK DESIGN INTELLIGENCE TEST FOR THE BLIND, (4) DEVELOPING A DIRECT TRANSLATION DEVICE TO ALLOW THE BLIND ACCESS TO PRINTED MATERIAL, (5) MEASURING HUMAN SONAR ABILITIES, (6) DEVELOPING A STATE WIDE FRAMEWORK OF ORIENTATION AND MOBILITY INSTRUCTION FOR BLIND STUDENTS IN PUBLIC SCHOOLS, AND (6) VARIOUS MOBILITY PROJECTS IN THE LOS ANGELES AREA. SPECIFIC AREAS FOR FUTURE RESEARCH ARE ALSO SUGGESTED. REFERENCES ARE LISTED. (RS)

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PREFATORY NOTE

The American Foundation for the Blind is pleased to publish these Proceedings prepared from the West Coast Regional Conference on Research Related to Blind and Severely Visually Impaired Children. The Foundation sponsored the meetings, which were held during the period of 8-10 March 1965 in San Francisco.

The purpose of the meetings and of these Proceedings is to bring together recent data from a number of diverse sources and different disciplines which have a common focus or interest. It is our hope that they may serve as a model for other regional conferences which will concentrate, on a working level, on the coordination of research efforts which will aid individual researchers in amplifying the implications of their results.

These Proceedings illustrate the Foundation's intent to disseminate information to the research community or to any person or group, regardless of area of concentration, who may profit from the subject matter or find it relevant to their own work. This publication conveys the views of contributors who have lent their talents to this subject for the benefit of all the disciplines concerned.

The papers were edited and prepared for publication by the International Research Information Service (IRIS), an information dissemination program of the American Foundation for the Blind.

M. R. Barnett
Executive Director
American Foundation
for the Blind

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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The West Coast Regional Conference on Research Related to Blind and Severely Visually Impaired Children

Chairman: *Milton D. Graham*
American Foundation for the Blind
New York City, New York

OPENING REMARKS

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American Foundation for the Blind
New York, New York

The primary object in this meeting was to communicate by thinking aloud. Several of the participants are actively engaged in research on blind and severaly visually impaired children. Others are engaged in services for children. All of us, from our various vantage points are concerned with the problems and potentialities of blind and severaly visually impaired children.

I had occasion last April to observe a meeting in Carmel of some 30 eminent sociologists who met on the topic: How Sociology Might Contribute to Vocational Rehabilitation. These were highly verbal men, but in many cases we found that they did not communicate. They were talking from different bases of experience, and they were talking with different definitions in mind. Since we also represent many professions and many disciplines, I have suggested that we try to make our meanings clear.

Let me start with the word *blind*. I think that those of us in psychosocial research consider the word *blind* in a functional sense. That is to say, the ultimate question is, what does sensory impairment mean to a person who has it? How does he function? How does it limit his functions? How must he adapt himself to a loss? How must he train himself in other ways to compensate, if possible, for the loss? We are speaking in a functional or behavioral sense not in a legalistic or clinical sense. If some of you have used the work *blind* to mean someone with 20/200ths or less visual acuity (that is, the legal definition) please say so. Many of us who attended several of the workshops at the National Institute of Neurological Disease and Blindness use this word to mean a person with no *useful* vision. We've tried to use the phrase *severely visually impaired* since then to mean something that is measurable: a physical condition. There is pathology involved.

We mean also that an impairment becomes a *handicap* only when it introduces psychological variance that is observable in behavior. We are all aware that two people with 5/200ths vision act quite differently: one acts like a blind man and the other acts like a sighted man. As I have said, our emphasis in psychosocial research is on how the man functions. The visual *efficiency* of a visually impaired person, rather than his acuity is, I think, the nub of the question for us. An impairment is measurable. A handicap is also measurable, but with much less certainty. So, let me say that when we used the words blind and severely visually impaired in this conference we tried to refer to the most accurately known facts, which are mostly medical.

The psychological aspects that follow from the impairment, i. e., the handicap, are also measurable by different measurable by different means. I found at the meeting at Carmel that most people were using handicap and impairment as synonymous terms, but I hope we did not do that: they aren't synonymous. Beyond these terms (blind, impaired, handicap), we may run across other definitions that obscure our meaning to others or our communicating with one another.

One more thing I want to add. The question has been asked, why a conference in San Francisco? Several reasons suggest themselves. There is so much good work going on in research here that is not known, even among this group in some instances, but even less in the rest of the country. This conference is one means of getting the work presented to other parts of the country.

I also recently expressed concern to the U.S. Office of Education about use of the new Public Law 88-164 monies. With money being given to states for their use, and the states then allocating money for research, there was no one in a national position who really knew what research was being undertaken; there was no feedback of information to the national office. Dr. Mosk, of the Division of Handicapped Children and Youth, told me that they had no provisions for holding conferences such as this, nor for collecting reports presented here. He did express interest in the meeting. If it proved useful (and we think it did), he would like to see the Office of Education undertake something similar.

In other words, I hoped this meeting might be a model for other regional conferences, especially since there is so much money for research coming from so many different sources. We should have some way of looking at the overall research effort. Certainly our greatest need now in the field is to get data; we need a body of knowledge from which to work before we start to form too many theories or to test possibly misleading hypotheses.

The device of a special conference is one way of getting to know how far along we are in our body of knowledge - who is contributing and in what ways they are contributing to it. I hope that ultimately, if this conference proves to be judged a successful venture by those of you who were in it, it might serve as a model for the rest of the country. Similar regional conferences would not be our - AFB - concern, but we would hope the concern of regional authorities of the U.S. Office of Education, the Vocational Rehabilitation Administration, or other groups concerned with national trends.

SECTION I

Surveys of Needs of Blind Children

Chairman: *Robert Scott*
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INTRODUCTION

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New York, New York

I want to make a few introductory remarks about research on blind children before we move to the presentations by Dr. Parmelee and Mr. Simmons. The remarks will be generalizations which, I feel, can be made about the present state of research in this area.

First, knowledge derived from empirical research on blind children is extremely spotty. Certain areas have been more thoroughly studied than others. A great deal more is known about the mechanical problems of education and training than is known about the psychosocial development of blind children. Research findings are much more numerous on the subjects of teaching braille, mobility, orientation, or certain academic subjects, than is known about the cognitive and intellectual growth of the blind child or the process of his personality development. This is not to say that some areas are more important than others, nor should it imply that the research in behavioral areas is complete. I only want to make the point that knowledge based on research of blind children is irregular and spotty, and tends to concentrate on certain problems while other problems are ignored.

The reasons for this differential emphasis are complex and to present them would require another paper. Basically I believe they derive from the fact that so many disciplines are centrally involved in the problems of blind children. There is no unified conceptual framework which is shared by these disciplines, nor do they share any commonly accepted priority of research problems.

Second, in this population very little is known about the sociological and psychological processes of growth and development. Aside from a few important pieces of research and writing on the psychological and developmental characteristics of blind children (some of which was done by persons in attendance here today) there is very little of substance to be found in the literature. For example, it is common knowledge to the educators and researchers in this field that blindness interferes with the growth and development of the child. There is, however, very little knowledge about which processes of human development are retarded by blindness, which processes of development are unaffected by it, and which processes are actually facilitated by it. Finally, it is not known which of the detrimental effects of blindness are curable. Nor is it known which of the incurable effects are improvable and which are unimprovable.

Another facet of psychosocial development which remains to be studied is the family. In all of the studies of growth and development (or socialization) of blind children, the children themselves have been the sole subjects of study. This exclusive orientation to the question ignores one of the fundamental facets of socialization, namely, the persons who are its agents. It is as important to study the parents of blind children as it is to study the children themselves. The beliefs of parents concerning blindness and its impact on their children are factors of critical importance in determining their growth and development. The child will only be able to learn what his parents believe he is capable of learning; he will only be able to do what they believe he is capable of doing. In short, the parents' conception of the developmental potential of their child will define the limits within which he can grow. I might add that similar studies of the beliefs about blindness among educators of blind children should also reveal important information about the kinds of capabilities they feel the child has. This entire question is essentially unstudied, and constitutes one of the major interstices in knowledge about blind children.

In the same way the fact that the blind child is an integral part of an operating family unit is often forgotton. His presence cannot help but alter the family unit itself, changing parents and siblings in very important ways. The impact of the blind child on other family members is of equal importance, in terms of research, as their impact upon him.

Third, the research done on blind children has usually been applied rather than pure or theoretical research. This situation stems from the fact that in an applied field such as work for the blind there is always a pressing need for answers to very troublesome practical problems. The function of applied research has been to facilitate the process of solving these problems. This is as it should be. The function of pure research (research which accumulates knowledge for its own sake), however, is to deepen and broaden the understanding of a problem. As such, it too has an important function in work for the blind. The extent to which research of this type is neglected will be the extent to which traditional (and often limited) conceptions of the problems of blind children will predominate in the thinking of workers for the blind.

Other general areas of research can be noted. For example, little is known about the differential impact of congenital and aventitious blindness upon personality growth and development in children. A definitive study of differences in cognitive and intellectual development in these two groups also remains to be done. The question of what constitutes reasonable expectations and unreasonable expectations of performance for blind children should also be examined. These are but a few areas which immediately come to mind when the question of research needs of blind children is considered. They are not necessarily the most important topics which need to be studied, nor are they even the most urgent. It would be possible to go on all day listing studies which could be done. I do not feel, however, that this would be of any particular value.

Two additional considerations about research on blind children should be mentioned since they are common to all studies which have been done. The first involves sampling and the second the application of research findings to social action programs.

The stumbling block of researchers who study blind children, and especially children of preschool age, is sampling. Blindness is a rare event in the general population, and rarer still among children. Computations which are based upon the most recent figures issued separately by the Bureau of the Census and the American Printing House for the Blind show that, among persons 18 years of age and younger, the estimated rate of blindness is about 0.32 cases per 1000 of the population. This means that in a sample of 1,000,000 persons of this age group, we can expect to find only 320 instances of blindness. This fact makes the identification of the universe of blind children (the total number of persons in a given place at a given time with this characteristic) extremely difficult. Any sample of blind children is always, to some extent, subject to question because the nature of the universe from which it is drawn is not known. Conversely, there is no way of drawing a random sample from such a universe. This means that one's ability to generalize findings of any study of blind children is seriously impaired, and will remain so until some practical means is found for the detection and reporting of new cases of blindness in children. As I have indicated, this problem is most serious in the case of preschool age children. This lacuna not only prevents the accumulation of reliable knowledge from studies of socialization and education, it also seriously hampers development of sound knowledge about the cases of blindness. This information in turn is essential for developing effective programs of blindness prevention.

The problem of sampling is therefore a major one, and its solution will constitute an important breakthrough in research on blind children.

Finally, I want to comment on the application of research findings to social action programs. In work for the blind a peculiar schism exists between research and practice. Few practitioners see the relevance of research findings for their work. Conversely, the researcher is often resistant to, and unsympathetic towards, the practitioner's concerns. These attitudes are reflected in the customary impatience of the former with the later. The result is that whereas research studies are included in the literature of work for the blind, they are seldom implemented through concrete programs of education and training. This situation is both ridiculous and unnecessary. It is ironic indeed that the little reliable knowledge there is about blind children is known only to the researcher, and not to the persons in whose hands it would do the most good. The failure of educators and others who work with blind children to make a serious attempt to determine the implications of research findings for the training of blind children, and to alter their programs accordingly, makes research in this field somewhat pointless. It is one of the purposes of research to provide knowledge which serves as a guideline for planning and altering social action programs.

In summary, then, we see that knowledge about research on blind children is not integrated into a commonly accepted theoretical frame of reference. Important problems for research, especially those relating to the socialization of blind children, have not yet been raised. In part, their answers will await a satisfactory solution to the critical problems of identifying the universe of blind children and then developing practical, economical, and effective means of sampling this universe. Finally, much work remains to be done on the question of translating research findings into social action programs.

A SURVEY OF BLIND, SEVERELY VISUALLY IMPAIRED, AND MULTIPLY-HANDICAPPED CHILDREN IN CALIFORNIA

A PRELIMINARY REPORT*

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Concern about blindness as well as about other neurological and sensory diseases has increased very considerably in recent years for a number of reasons, not the least of which is the establishment in the Public Health Service of the Neurological and Sensory Disease Service Program. The interest of the medical profession has been stimulated by new developments, and by the prospect for future advances. Numerous voluntary health agencies have been organized to meet some of the problems resulting from neurosensory disorders, including blindness, and they have in turn stimulated further research and development of needed services. Public agencies which must deal with the health, social, and financial burdens caused by these diseases are constantly seeking new and better ways to alleviate some of the problems.

This growth of interest has stimulated both basic and applied research into the needs and services for those afflicted with neurosensory disorders. While there has been some success in basic and applied research leading to prevention of blindness, for example, in the case of retrolental fibroplasia, much remains yet to be done in this field. Short of such an epidemic occurrence, prevention seldom receives a sufficiently "all-out" trial, and even the most modest approaches are constantly pressured to show an immediate reduction in blindness. This cannot be, for by its nature a preventive program dips into a reservoir of incipient blindness - and brings up more cases.

The all but overwhelming growth in population - and California is still growing at the rate of about 50,000 people a month - is a guarantee that the figures on blindness won't diminish. This thrusts upon us a new awareness of how dull the tools are for the research that is needed before prevention can be undertaken. Not only is prevalence data sparse, but incidence data for blindness is lacking altogether. We in public health define prevalence as the amount of blindness that exists if on one day all blind people were to be counted. Incidence is the new accretion each year. The nature and distribution in the population of the major causes of blindness are incompletely known. The total impact in human, social, and economic terms has yet to be fully demonstrated. But most of all, because it is so primary to preventive steps, we lack to a considerable extent the epidemiological clues which must point the way.

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* From Division of Preventive Medical Services, California State Department of Public Health, Berkeley, California.

How is information obtained that is needed for this? The severe limitations of both reporting mechanisms and statistical sampling surveys are familiar. Add to the incompleteness present in either system what the respondent doesn't know and what science doesn't know, and planning for prevention becomes an arcane practice.

When a study of multihandicapped blind children is undertaken, the problems of study are further compounded. Information from the California Health Survey concerning medically attended conditions of respondents and members of their household reveals neurological and sensory conditions for 28.4 females per 1000 per year and for 16.2 males per 1000 per year.

These figures understate the problem for a number of reasons. In the first place the survey did not include persons in hospitals or institutions; it grouped data on accidental injuries and on neoplasm affecting the central nervous system with accidental injuries and neoplasms of other sites; it is believed there was substantial underreporting of certain neurological conditions and overreporting of other chronic conditions not neurological or sensory.

By their very nature neurological and sensory disorders present special problems to the medical profession and to the community. While the total number of cases of all such conditions is quite large, the frequency of some of the conditions is quite low. The average physician is faced with the difficult task of diagnosing and treating something he may know very little about. Referral to appropriate specialists is not as easy as it sounds. They may be few and generally located only in major population centers.

In addition to the medical problem each case of neurological and sensory disorder creates a severe social problem beyond that associated with many other chronic diseases. The family may need financial assistance, special education and training, medical social counseling, rehabilitation, special residential facilities, and other scarce and expensive community services. Some idea of the magnitude of the problem may be gained from the fact that each year the California state government alone spends more than 120 million dollars just to alleviate some of the effects of neurological and sensory disorders. Not included in this figure are expenditures financed by federal grants, capital outlay cost, and a host of programs and services in which the expenditures for neurological and sensory disorders cannot be differentiated from other program expenditures. The Crippled Children Services in the

State Health Department alone spends about 3 million dollars a year for the diagnosis and treatment of neurological and sensory disorders. Additional direct expenditures in the state by the federal government, local governments, voluntary health groups, and by private individuals exceed greatly the figure quoted.

In terms, then, of the numbers and cost, the neurological and sensory disorders are a very significant problem. What part of this is blindness or severe visual impairment? Although in terms of social and educational needs they may differ, from the orientation of prevention they mean the same thing. Information about the cause is of primary importance to action. Until the problems can be described we can only hope for the attention and resources needed for their solution.

Recently the Prevention of Blindness Program in the State Health Department undertook a study to update information on blindness in children last gathered in 1955. An attempt was made to get information on blind children up to age 18 from all possible sources in the state. Because of the significance attached by public health to diagnosis and etiology, our criterion for the study was a medical record or the very nearest to a physician's statement which we could find. Working with medical records for investigative purposes can be a frustrating experience. Few physicians, hospitals or clinics, institutions or agencies, keep their records by diagnosis, or even cross-file with administrative records in this way. The criteria for establishing a diagnosis have great variation among practitioners and that most essential knowledge for any preventive action, the underlying or primary cause, is seldom carefully determined and precisely recorded. If this is generally true of medical records, imagine what the situation is in the neurosensory field, where the diagnostic and etiologic aspects of the problem are, to begin with, perhaps more obscure than in other fields.

For the purposes of this survey 19 separate sources of records were investigated and information obtained from each, most of it by visiting and extracting the information from medical records. As a state agency, we experienced no difficulty in gaining access to medical records because confidentiality is preserved and interest in the records was interpreted as solely for statistical purposes. For this preliminary report only limited tabulations are available since the data have not been machine processed yet. However, all duplicate records have been eliminated. Particular attention has been paid to the existence of impairments in addition to those of vision.

A total of 3129 blind children up to age 18 were recorded. Of these children 113 were of preschool age. According to the notation on the record 2701 of the children were blind by definition.*

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* Accepted as central visual acuity of 20/200 or less in the better

An additional 22 children were stated to be blind, but with no indication on the record of the degree and a total 406 children were counted as having impaired vision to a degree not stated, but indicated as being severe.

Of all recorded blind in the study 1417 children, approaching 50 percent, had additional impairments, 1045 of these being mental retardation. The other impairments were neurological, general or unspecified - 342; speech defects - 304; deafness or hearing loss - 179; orthopedic - 153; cerebral palsy - 137; emotionally disturbed - 92; educable mentally retarded - 44; and 24 fell into miscellaneous categories. A child is counted for each disorder in addition to his vision impairment.

Those working in education or social fields may find these figures at considerable variance with their experience because of their orientation to functional definitions of the problems. Here the orientation is to diagnosis and causation. From the standpoint of prevention, it is of paramount importance to establish cause - for example, infectious disease, accident, or prenatal influence - for preventive measures must be aimed at this. How the child functions with impairments is a matter for total appraisal and is subject to change over time. It does point out the necessity for getting together the two groups who are studying blindness in children.

Analysis of blindness and severe vision impairment by site and type of affection reveals the following: retrolental fibroplasia, as expected in children, was the most common diagnosis, numbering 794; optic nerve atrophy - 314; cataracts - 308; retinal degeneration and other retinal affections - 181; myopia - 150; glaucoma - 127; uveitis - 65; and keratitis - 30.

A study of this kind always has two other large categories: "Unknown," that is, not established on examination or no report on site and type of affection; and "Other," that is, all other conditions, not specified. There were 753 Unknowns and 338 classified under Other in the preliminary count.

Included among conditions and disorders in which the specific type and site of affection were not recorded are structural anomalies of the eyeball in general, ill-defined lesions, and uncommon disorders of the eye. The majority of severe vision impairments classified under Other are of course congenital, arising from generalized neurological defects, brain dysplasia, and accidents of birth.

It is always difficult to know how to categorize diagnostic

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eye with best possible correction, or a field defect in which the widest diameter of the visual field subtends an angular distance no greater than 20 degrees.

and etiologic information so that it is most useful. Here diagnosis has been coded to site and type of affection including anomalies and such congenital conditions. However, congenital anomalies, regardless of site and type of affection, are lumped when etiology is considered.

Classification of blindness and severe vision impairment by etiology is difficult on the basis of information available in medical records. The largest group of impairments are recorded as congenital; these are tabulated in the category of prenatal influences, which of course, however, do have an antecedent etiology, such as maternal infection, trauma, prematurity, heredity.

Much interest is focused on needs and services to handicapped children and the following details may be of interest. A count shows that 1842 children with impaired vision only or combined with other disorders were in public schools; 781 were in mental institutions; 170 were in special schools, including private and residential schools; 151 were in some unstated location; 146 were at home; and 32, at the time we made the study, were on preadmission to hospital or awaiting diagnosis in one of our various state facilities. Perhaps one of the things that this simple report points out is that a very important need, in addition to surveys of the needs for services for multihandicapped children, is for a precise study of these children so that the clues can be found which can lead to more vigorous preventive efforts.

BLINDNESS IN CHILDREN: INCIDENCE IN THE LOS ANGELES AREA*

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INTRODUCTION

Currently special services of all kinds are being developed for handicapped children. These include medical care, special education, vocational guidance, and recreational facilities. In order to know how to plan these services it is necessary for both private and public agencies to have some idea of the need for these services. It has been particularly difficult to determine how many and what kind of facilities to provide for blind children. First of all, there is no public registry for people who are blind. Secondly, in the past 20 years, there has been a sharp fluctuation in the incidence of blindness in children that has confused the issue. Retrolental fibroplasia, a condition that is the cause of blindness in premature infants, because very prevalent between the years 1945 to 1955. This condition was apparently caused by the high concentration of oxygen used in the care of premature infants at that time (2). During this period more than 50 percent of all of the children known to agencies to be blind, were blind due to retrolental fibroplasia (1). With the ultimate awareness of the role of oxygen in this condition and strict control of its use, the number of children blind from this cause decreased dramatically. One had the impression that blindness in children would disappear, but it did not. In fact, to some working in this field, there seem to be as many blind children now as ever before.

In this study we attempted to obtain some ideas of the incidence of blindness in children of 18 years of age, or less, living in the Los Angeles area.

MATERIAL AND METHODS

This attempt to identify all blind children of 18 years of age, or less, in Los Angeles and its environment was made during the summer of 1963. To achieve this, all agencies known to render ser-

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* This study was supported by the American Foundation for the Blind.

vices to blind children were contracted. These agencies were most cooperative. They supplied us with the initials and birth dates of each child known to them and also provided additional information, when available, such as the cause, degree, and age at onset of the blindness. Blindness was defined as vision of 20/200 or less in the best eye with the best correction. Once this data was collected the children known to more than one agency were identified so that they would not be counted more than once. As might be expected the public schools provided us with the most complete data. Our best information relative to preschool children came from the State Services for the Preschool Blind of the Board of Education of the State of California. Unfortunately only a portion of the preschool blind are referred to this service. There was no other good source of information concerning these young blind children. The ophthalmologists and ophthalmology clinics were not surveyed in this study. The causes of blindness were accepted as recorded in the agency records and were not always as precise as one would desire.

RESULTS

A total of 726 children 18 years of age, or less, considered legally blind, were identified in the Los Angeles area. Of these 52 percent (379) were male, 47 percent (339) were female, and for 1 percent (8) the sex was not reported (see Table 1). Seventy percent (507) were determined to be blind within the first year of life, 3.3 percent (24) after one year of age, and in 26.7 percent (195) the data of onset of the blindness was not known (see Table 2). The blindness was considered total in 28 percent (200), limited to light perception in 11 percent (81), some vision (finger counting to 20/200) in 23 percent (164), 20/200 in the best eye corrected in 26 percent (188), and the degree of vision was not reported in 11 percent (84), and was not definable by these criteria in 1 percent (9), (see Table 3).

The major causes of blindness by age groups are indicated in Table 4. For all age groups combined, retrolental fibroplasia was the leading cause accounting for 32 percent (233) of all the blindness. However, in the children of less than six years of age, it accounted for only 12.5 percent (9) of the blindness. The other causes were, in order, congenital cataracts 13 percent (95), optic atrophy 9 percent (68), albinism 5 percent (36), myopia 4.5 percent (34), congenital glaucoma 4 percent (30), congenital nystagmus 3 percent (26), macular degeneration 2.6 percent (19), retinoblastoma 2 percent (15), trauma 0.8 percent (6), anopthalmia 0.8 percent (7), chorioretinitis 0.6 percent (5), miscellaneous diagnoses 16 percent (116), and unreported 5 percent (36).

Thirty-six percent of all of the children with blindness, as a result of retrolental fibroplasia, were 11 or 12 years of age with birth dates in 1951-1952. The other causes of blindness seem to occur with the same frequency at all ages except in the preschool years, when our sources of information were inadequate (see Figure 1).

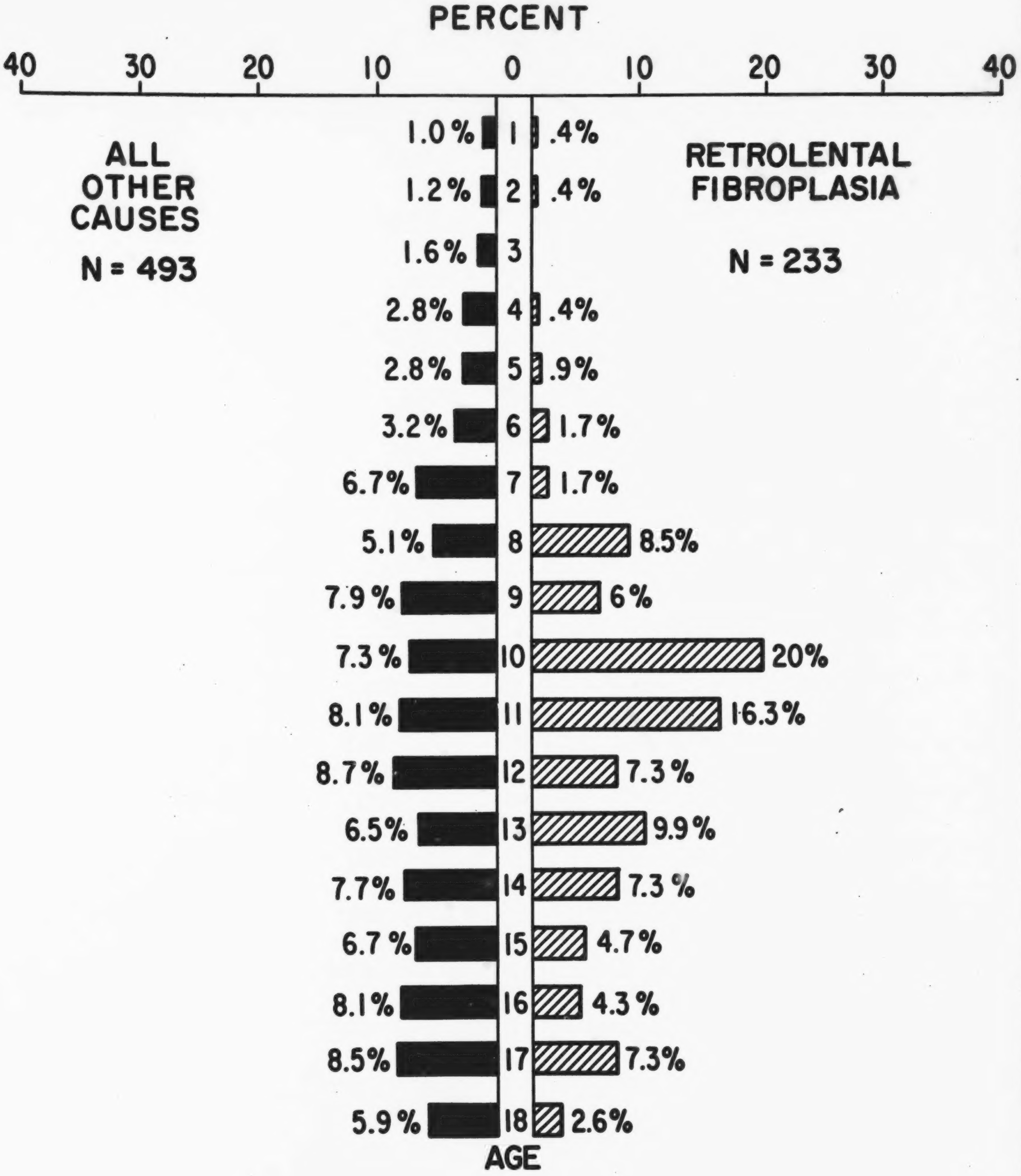

Figure 1. Age Distribution of Sample by Cause of Blindness.

Since the majority of the children were determined to be blind within the first year of life, one can assume that the distribution of blindness might be the same for causes other than retrolental fibroplasia in the preschool period as during the school years.

In Figure 2 the contribution of retrolental fibroplasia to the total blindness for each year of age is illustrated. This more clearly indicates its temporary dominance.

Of the children of school age 60 were considered mentally retarded. These children were living at home and were receiving help from some agency. The number of mentally retarded blind children at home not receiving help from some agency is unknown. Thirty-eight percent (23) of these children had retrolental fibroplasia, which is the distribution expected from the total population of blind children. We could not find out how many blind children from the Los Angeles area were in the state hospitals for the mentally retarded.

DISCUSSION

It is worth emphasizing that blindness in children has not been eliminated by the prevention of retrolental fibroplasia. Congenital cataracts, congenital glaucoma, and optic atrophy are still major causes of blindness along with many other congenital anomalies affecting the eyes. During the period when there was suddenly a large number of children blind due to retrolental fibroplasia, doctors, educators, recreation specialists, and other community groups, as well as parents became aware of the need for special facilities for these children. As these were developed all blind children benefited and better use was made of these facilities than ever before. Blind children who had formerly been kept isolated at home were now brought to nursery schools and local public schools. They were sent to camps and to special park programs. This interest in keeping blind children involved in community activities is growing. Thus, even with a possible decreased number of blind children, there is likely to be an increasing demand for special facilities. Furthermore, we must not overlook the fact that our total population is increasing; thus, the total number of blind children can increase even if the proportion of blind children per unit population decreases.

There is evidence that the mental and social development of blind children can be greatly enhanced by providing them with a wide range of experiences early in life (3). Our survey revealed that 70 percent of the children had the onset of their blindness in the first year of life. Therefore, it is important that we provide special services for blind infants and preschool children. Counseling for parents of blind children of all ages is important, but especially so for the parents of blind infants. Nursery schools

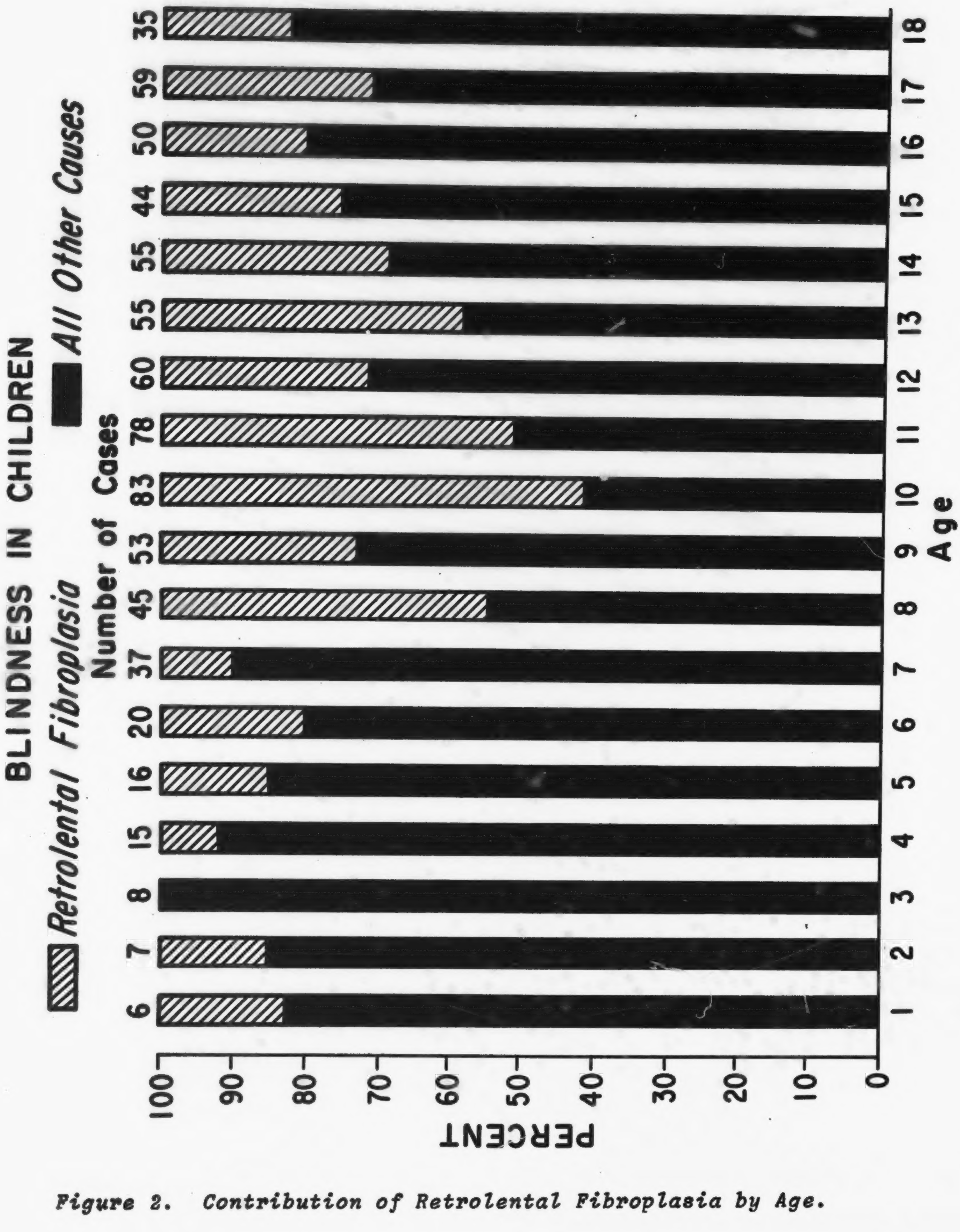

Figure 2. Contribution of Retrolental Fibroplasia by Age.

for blind children, as well as nursery schools for sighted children that will accept blind children, are helpful. These children need to be prepared for school so that they will be able to take full advantage of the special educational opportunities available in the schools today. In the course of this study we contacted all known public and private agencies that provide services for blind children. We were pleasantly surprised at the number of these services. In Los Angeles we are fortunate to have parent counseling services provided by the State Services for the Preschool Blind of the State Board of Education. We have the Nursery School for the Visually Handicapped, as well as 22 nursery schools for sighted children that will accept a blind child. Unfortunately, even these fine services do not meet the needs of preschool blind children in the Los Angeles area. We also found that very few services are provided for the blind child who cannot attend the excellent special public school programs because of emotional problems or delayed mental development.

We are hopeful that this study will be of some aid to directors of public and private agencies in planning services for the blind children.

SUMMARY

The need for information concerning the number of blind children in a community in order to plan community facilities for them prompted a survey of all blind children of 18 years of age, or less, in the Los Angeles area. This survey was done in the summer of 1963. All public and private agencies providing services for blind children in the Los Angeles area were contacted for information. In this manner, 726 blind children were located; of these 507 or 70 percent had been blind since the first year of life. Only 200 or 28 percent were totally blind; the others were legally blind or had some degree of vision. Retrolental fibroplasia accounted for 233 or 32 percent of the cases. Most of these cases were among children of 7 to 14 years of age with birth dates between 1949 and 1956. Fortunately, this cause of blindness seems to be nearly eliminated. However, the number of blind children due to other causes continues to be large and will increase in absolute numbers with the increase in the general population. It is, therefore, apparent that public and private agencies should increase their services for blind children. Since the majority of the children are blind from early infancy, parent counseling and nursery school facilities should be emphasized to prepare children for the already existing public school programs for the blind. Special facilities are also needed for the mentally retarded or emotionally disturbed blind children who may never be able to go to the public schools.

TABLE 1

SEX DISTRIBUTION

AGE	MALE	FEMALE	UNKNOWN	TOTAL
0 - 3 '60 - '62*	13 62%	8 38%		21
4 - 6 '57 - '59	36 70.5%	15 29.4%		51
7 - 11 '52 - '56	147 49.8%	147 49.8%	1 .3%	295
12 - 14 '49 - '51	83 48.5%	87 50.8%	1 .5%	171
15 - 18 '45 - '48	98 53.2%	80 43.4%	6 3%	184
AGE UNKNOWN	2 50%	2 50%		4
TOTAL	379	339	8	726
PERCENT	52%	47%	1%	100%

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* Birth years

TABLE 2

AGE OF ONSET OF BLINDNESS

AGE	BIRTH TO ONE YEAR	AFTER ONE YEAR	UNKNOWN	TOTAL
0 - 3 '60 - '62*	8 38%	0	13 62%	21
4 - 6 '57 - '59	24 47%	0	27 53%	51
7 - 11 '52 - '56	217 73%	5 2%	73 25%	295
12 - 14 '49 - '51	130 76%	4 2%	37 21%	171
15 - 18 '45 - '48	128 69%	15 8%	41 22%	184
AGE UNKNOWN			4	4
TOTAL	507	24	195	726
PERCENT	70%	3%	27%	100%

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* Birth years

TABLE 3

DEGREE OF BLINDNESS

AGE	TOTALLY BLIND	LIGHT PERCEPTION	SOME VISION**	20/200	OTHER	UNKNOWN	TOTAL
0 - 3 '60 - '62*	2 9%		1 5%			18 85%	21
4 - 6 '57 - '59	6 12%	4 8%	3 6%	6 12%		32 62%	51
7 - 11 '52 - '56	91 31%	40 13%	63 21%	82 28%	6 2%	13 4%	295
12 - 14 '49 - '51	51 29%	20 12%	43 25%	49 29%	2 1%	6 3%	171
15 - 18 '45 - '48	50 27%	17 9%	54 29%	51 28%	1 .5%	11 6%	184
AGE UNKNOWN						4	4
TOTAL	200	81	164	188	9	84	726
PERCENT	28%	11%	23%	26%	1%	11%	100%

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* Birth years
** Some vision = Finger counting to 20/200.

TABLE 4

CAUSES OF BLINDNESS

	AGE AND BIRTH YEARS							
CAUSES	0 - 3 '60 - '62	4 - 6 '57 - '59	7 - 11 '52 - '56	12 - 14 '49 - '51	15 - 18 '45 - '48	AGE UNKNOWN	TOTAL	PERCENT
CHORIORETINITIS	0 -	0 -	2 (.7%)	1 (.6%)	2 (1%)		5	.6%
ANOPHTHOLOMOS	0 -	1 (2%)	2 (.7%)	3 (2%)	1 (.5%)		7	1%
RETROLENTAL FIBROPLASIA	2 (9.5%)	7 (13.7%)	123 (41.7%)	57 (33%)	44 (24%)		233	32%
OPTIC NERVE ATROPHY	5 (23.8%)	7 (13.7%)	17 (6%)	17 10%	22 12%		68	9.5%
CATARACTS	2 (9.5%)	13 (25.5%)	35 (12%)	24 (14%)	21 (11.5%)		95	13.1%
TRAUMA	0 -	2 (3.9%)	4 (1%)	0 -	0 -		6	.8%
GLAUCOMA	0 -	1 (2%)	12 (4%)	7 (4%)	10 (5.4%)		30	4.1%
NYSTAGMUS	1 (4.8%)	0 -	12 (4%)	3 (2%)	10 (5.4%)		26	3.6%
ALBINISM	0 -	6 (11.8%)	12 (4%)	6 (3%)	12 (6.5%)		36	5%
MYOPIA	0 -	1 (2%)	14 (5%)	5 (3%)	14 (7.6%)		34	4.7%
MACULAR DEGENERATION	0 -	0 -	9 (3%)	5 (3%)	5 (3%)		19	2.6%

TABLE 4 (continued)

CAUSES OF BLINDNESS

	AGE AND BIRTH YEARS							
CAUSES	0 - 3 '60 - '62	4 - 6 '57 - '59	7 - 11 '52 - '56	12 - 14 '49 - '51	15 - 18 '45 - '48	AGE UNKNOWN	TOTAL	PERCENT
RETINOBLASTOMA	3 (14.3%)	4 (7.8%)	5 (1.7%)	3 (2%)	0 -		15	2%
UNKNOWN	2 (9.5%)	5 (9.8%)	10 (3%)	8 (5%)	7 (4%)	4	36	5%
OTHER	6 (28.6%)	4 (7.8%)	38 (13%)	32 (19%)	36 (19.6%)		116	16%
TOTAL	21	51	295	171	184	4	726	100%

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THE CHANGING CAUSES OF BLINDNESS

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INTRODUCTION

My position is that of a physician primarily, one who does research in some aspects of eye disease, and not as one directly associated with blind children and their needs as individuals.

I can set into some perspective the changing causes of blindness as they relate to children, and some of the changes in medical and surgical care in the treatment and prevention of blinding diseases in children. It is clear, indeed, that we are discussing blindness in the United States and not the massive social and public health problems which underlie infectious and nutritional diseases, which create such a serious incidence of blindness elsewhere in the world. In medical terms, such diseases as trachoma, vitamin A deficiency, and the like are no longer riddles, of course.

I shall also not be concerned with blindness and adaptations to it as a mechanism for understanding psychology or physiology.

The justification for studying blindness in children, it seems to me, relates really to two areas.

1) There are different medical causes for blindness in children as opposed to adults.

2) A separate and quite different educational adjustment problem is presented by blind children as opposed to older persons.

The prevalence of blindness is a variable thing by age. Reference to the statistics provided for this conference show that the prevalence is almost static from the age of 14 up to the age of 35. There is then a very modest increment up to the age of 45 where the prevalence rate again begins to increase. The implication of this is that the cause and creation of blindness occurs early in life and then again in the elderly, with a long hiatus between. I would go further than this and say that these figures could be regressed almost back to infancy for this early age group. This is reinforced by the discussion of Dr. Parmelee, who brought out quite well that blindness in children is primarily the result of prenatal or immediately neonatal causes. Reference to other published series also would indicate that 60 to 70 percent of blindness in preschool children is of natal or prenatal origin.

I believe this proportion will continously rise due to increasingly good prenatal care and increasingly better obstetrical and neonatal care. There will thus be increasingly greater numbers of children, many of whom have other neurological or physical defects, who will make it over these initial hurdles and become added to the blind population. There will be a total increase in the number of people born. All of this will continue to supply a large and increasing blind population, consisting more and more of children with congenital, prenatally established causes for their blindness.

As far as research and treatment is concerned, I think there are few diseases that are going to respond so nicely as retrolental fibroplasia, and the effects of such things as the recent thalidomide crisis. Unlike these problems which are created by us, the majority and the residual are naturally occurring diseases about which we know very little indeed and which are not nearly so approachable.

CAUSES AND TREATMENT

Congenital Cataract

Congenital cataract will continue in one way or another to be high on the list of causes of blindness in children. Prevention is possible in some areas, and will certainly be carried out. At the present these can be identified as those cataracts caused from rubella which can be prevented by immunization of all women prior to pregnancy. Limitation of drugs during pregnancy, some of which may be influential in the cause of birth defects, including cataract, will also cause a decrement in the incidence. Identification of certain metabolic diseases such as galactosemia will remove a small group who are potentially and practically treatable if identified at birth. Not preventable, at least in the direct sense, are those cataracts which are linked with heredity, and those due to intrauterine inflammations and other totally unknown causes. Since it is probable that many of these causes operate in the first few weeks of pregnancy, when the mother is hardly yet aware of her pregnancy, it seems most unlikely to me that any treatment or prevention will be forthcoming.

The treatment of congenital cataract cannot be expected to improve to any massive extent. This is a consequence of the structure of the eye in infacy, and an effect of other defects present in many eyes which have congenital cataracts, making them unsatisfactory visual organs even when the cataract is removed.

Retinal Maldevelopment

Retinal maldevelopments are serious and almost totally untreatable causes. Many of these are hereditary, and some are associated with prematurity and poor oxygenation of the retina at birth. A number of gross malformations and corneal abnormalities are fixed structural abnormalities about which little can be done, nor do I see a great promise for the future for their treatment. While corneal opacities and defects are potentially treatable by grafting or other techniques, these constitute so small a proportion of the blind in children that their treatment will influence the total problem little indeed.

Congenital Glaucomas

Congenital glaucomas are of several kinds. The most common of these responds to current techniques which have remained unchanged for almost twenty years. The possibility of curing a higher number of such cases relies entirely upon their being seen at an earlier age. This, of course, is an educational and sociological problem. A number of other congenital glaucomas, similar to many congenital cataracts, are associated with neurological abnormalities. These comprise a goodly segment of those cases seen at institutions for the mentally retarded where such a large portion of our blind population resides.

Hereditary Causes

Heredity unquestionably can be identified in the transmission of many causes of blindness and limited vision in children. This includes albinism, Marfan's disease, many retinal and lens diseases, etc. The hereditary causes of blindness will probably increase only to a modest degree, except insofar as these somewhat defective children are able to be kept alive in greater numbers at birth. If you assume a recessive disease which occurs about 1 in 10,000 instances, then genetic considerations will show that it takes something like 40 generations to double the incidence of that disease. Certainly eugenic factors are really of little help in this way. For dominant diseases there will be an increase in the incidence of disease in each generation proportional to the number of people who are saved and who procreate. Many of these diseases are becoming treatable at present, and because of that fact these people will have more children. The implication of this, of course, is that what resources you spend on defining and treating genetic defects need to be increased for the care of more persons similarly afflicted in future generations.

It is interesting in this regard that probably we are becoming a weaker genetic race as we become more able to control our environment. Retinoblastoma is a good case in point. Only one-third of retinoblastomas are bilateral, so that only one-third are susceptible to blindness. The cure rate at the present time for all cases is close to two-thirds. When this is all added up, including the incidence, there is approximately 1 in 300,000 persons who will become blind of retinoblastoma, a very modest incidence. For the child who has retinoblastoma, however, the incidence of going blind even at the present time is about 10 percent, and many parents who are aware of their ability to create such a child are willing to take this risk.

Inflammations and Infections

There are a number of inflammations and infections which are active in children, parasitic, bacterial, and viral, which are potentially amenable to treatment or prevention. While these do not constitute a major portion of the causes of blindness, I feel that at some date in the future these are potentially responsive.

Myopia

I would make one or two comments on myopia which frequently comes up in the statistics on blindness. A great portion of this myopia is secondary to prematurity, or represents really a partial stage of retrolental. It can be anticipated that this proportion will grow as more and more premature infants are saved. I would also be most concerned that the classification of myopic infants as far as educability is concerned be determined upon their visual acuity at near. It is the common instance to see a child who can, even with corrective glasses, see only 20/200 for distance, but can read the finest print one or two inches from his eye. I feel that these statistics showing myopia as a common cause for blindness are much in error for this reason.

Ocular Disease

Ocular disease associated with central nervous system defects are a commonplace, and when such a generalized defect is present it almost invariably involves both eyes, causing some degree of impairment. I feel that this group will continue to increase proportionately as time goes on, since it comprises a population with hereditarily determined disease, or disorders, or inflammation caused at an early stage of pregnancy.

SUMMARY

The number of children saved or prevented from blindness will, of course, increase. The residual group will be increasingly composed of those with associated central nervous system defects and hereditarily determined causes, about which we will be able to do little or nothing in the way of treatment. The otherwise normal child who was blinded by some adventitious cause will be encountered less frequently. The remaining group, with associated neurological defects, will become an increasingly difficult educational and sociological problem.

SOME OBSERVATIONS ON RESEARCH TECHNIQUES

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I must begin by confessing my ignorance of research concerning blind children. Most of the work that I've done has had to do with older blind people. Nevertheless, I thought I would discuss very briefly a couple of projects that I've been involved in that might be of interest to you.

Before I do, I would like to say something about the figure reported by Mr. Simmons on mental retardation. To me it was somewhat shocking, I didn't realize that the extent of mental retardation was so great. I would be very interested to know what some of you think about the reliability of this figure and whether it's likely to be found in other states.

I hope we can discuss the important educational and vocational implications of this finding for the future adjustment and development of what is apparently a sizeable proportion of the young blind population. Even if there is considerable error in this figure, it means that given the life expectancy of these children, the problems of educational and vocational adjustment in their life span are going to be very serious indeed. Your chairman spoke earlier about some of the problems we all face in getting data on blind people. This applies to them at all ages, not just to the young. The problem is fairly simple in a way; there aren't very many blind people to begin with. And although the U. S. census actually used to count them, it stopped doing that a long time ago. As most of you know, I'm sure, some states register or list blind people. Some of them do it efficiently; some do it inefficiently; some of them require registration or listing of blind people; some don't. In some states there is a high degree of cooperation on the part of ophthalmologists and other reporting institutions and professionals; and in other states there isn't. Now, recently, as you also probably know, the National Institute of Neurological Diseases and Blindness has entered the scene and with the cooperation of a number of states is trying to set higher standards for reporting and recording statistics on blindness. So far, I think 9 or 10 states are involved in the so-called "model reporting area" and, of course, the dream is that all 50 states will eventually join in this effort; then there will be standard or uniform reporting procedures for the whole country. I suspect that's going to take quite a while. It's taken quite a few years just for 9 states to reach the point where they could provide reliable, useful data. It will probably take many years before all the states are included. When they are, I think we will begin to get the kind of data on incidence and prevalence that you've been asking for and that we all need so desperately.

Meanwhile, we have to rely on other strategies to get information on blind people, young or old. I think in the case of blind children, particularly those who are most severely impaired, and particularly those of school age, you have one advantage over those of us who are studying the middle aged or elderly blind. Since many of them are in schools of one kind or another, you have immediate access to some kind of information about them. So although those of you who are working directly in this field may feel somewhat diffident about the reliability of your statistics, you have a great advantage over those of us who have to rely on other sources of information, institutional or otherwise, for information about older blind people. As I say, many blind children of school age are in schools of some kind or another. The schools know who they are and even have some idea of how blind they are. Of course, this doesn't help too much with respect to preschool children. And I would also suggest that it probably doesn't help too much in the case of the less severely or functionally blind children at preschool or school age.

Now I wish to share with you some experiences I have had in research on blindness. As I said before, registers of blind people in most states are incomplete. What this means is that there is bias in these lists; they usually pick up cases of people who are most likely to be in need of services or if not that, at least the ones who know about the help available and are getting it. Consequently, there is an important group missing which we sometimes call the "hidden blind." This is particularly true of the older age groups who are unknown to public or private agencies. We know there is a missing group because if we subtract from the total estimated blind population in any state or area the numbers who are known or reported to various agencies, there's always a difference. And sometimes there's very great difference. From a research point of view, as well as from a social welfare point of view, the problems of the hidden blind are very important indeed. It is quite possible that many of them are able to adjust to their impairment or cope with it without help from any kind of agency or institution. On the other hand, it's also possible that some of them simply don't know that services are available. Many of them don't even know that they're blind.

A few years ago we decided to try to learn about the hidden blind. We could not depend on a register or list from which to sample, because as Robert Scott pointed out, you can't draw a good sample if you don't know what you're sampling from; that is, if you don't have reliable and accurate data on the total population, which in this case is blind people of all ages.

So one device that's been used in a number of surveys in California, and in the country as a whole, is what we call a sample household survey. We conducted such a survey in Cleveland, Ohio. What we did was to adapt the functional definition of visual impairment which has been used by the National Health Survey; that is, defining visual impairment as inability to read ordinary newspaper print with or without glasses. As I've just said, in most communities and in most states there is no immediate way of learning who blind people are and where they are. We hit upon the idea of sampling households and developing techniques of screening people in those households. By "screening" I mean finding out about the major health characteristics of persons living in the household and determining who, if any, were visually impaired and who might be blind. I've reported on this recently in an article in *Public Health Reports* (1).

Without going into methodological details, I can tell you that if we had drawn a sample of two or three thousand households, personally visited each household, and then conducted a screening interview, it would have been very expensive. So we tried to see whether we could get some very crude data by using the telephone.

What we did, then was to call at random a sample of approximately three thousand households in the city of Cleveland. In a five-minute period we were able to obtain data about the health characteristics of all the people of all ages living in the household. And the key question, of course, was "is there anybody in the household who has serious trouble seeing?" That was the crude screening question we used. It was merely intended to give us an idea as to which households we would have to follow up on later in order to conduct a more rigorous and systematic study of persons with visual impairments.

Many questions have been raised about the very idea of doing such a study over the telephone. I don't want to take your time with technical details; but one question that might have occurred to you is whether there might be a certain bias in using the telephone because blind people are so poor that they can't afford telephones. Well, we actually did check on this; we took a sample of a group of known blind people and we found that the proportion with telephones was just about as great as in the general population. This satisfied us that the telephone technique would not be biased against blind people in that respect. Anyway, after conducting our telephone screening, we were able to identify households in which people had been reported, either by themselves or by other family members, as having serious trouble seeing. We then sent interviewers to their homes.

I hope ophthalmologists will forgive me when I say that we tried to make amateur ophthalmologists out of these interviewers with the help of an ophthalmologist in Cleveland and an advisory group of ophthalmologists who helped us select a testing device. It was a simple, relatively inexpensive Good-Lite Company screening device with which we used the Sloan letter card at ten feet. This was one of two tests we conducted. It was the simplest vision test that we could hit upon. It was portable and relatively easy for interviewers to operate. We also used a near vision test, the Lebensohn Near Vision reading card. So our interviewers went to these homes and conducted vision tests with all people for whom serious trouble seeing had been reported.

Among the many results of this study, I mention this because I thought that it might be useful for you or for anybody who would like to escape from reliance on lists of known blind people, young or old, in a relatively inexpensive and rapid way and get data on much larger populations.

We tried to validate our vision tests with data from physicians and ophthalmologists, and while we found a considerable amount of disagreement, we're by no means certain yet where the errors lie. Obviously, considerable error lies in our technique, but we have reason to suspect that there was some error in physicians' reporting and recording procedures themselves, so that the question of validity is still open.

We also found that in households with telephones, the bulk of our sample, the rate or the prevalence of visual impairment was about what you would have expected if we had done it altogether face-to-face; that is to say, the prevalence rate matched pretty closely the National Health Survey figure that we used as a very rough yardstick.

Am I personally a little bit ambivalent about telephone surveys because I hate the telephone myself, and I sympathize with people who don't like to be bothered by interviewers or salesmen or anybody else on the telephone.

But the sad fact is that in this day and age, with the increasing cost of doing research, the telephone is becoming increasingly popular as a technique of reaching people for various purposes, and not only health research.

There are some obvious problems here in trying to apply such techniques to the study of blind children. One problem that occurs to me immediately is conducting some vision tests like ours with preschool blind children; but those of you who are familiar with this may be able to devise vision tests that could be adapted for household use. Since a great deal of vision testing is being done by nonmedical people - particularly teachers and nurses - our general assumption was that perfectly useful, if not medically or scientifically the most valid, data could be obtained on large populations, in a very rapid way.

There are also some limitations in any survey where you rely on what people themselves say about their health. We compared what people said they could read with what they actually *could* do when we presented them with things to read. There was error in both directions; some said they could do things they couldn't; and some said they could not do things that they actually could.

I'm not convinced that this technique could be used in research on blind children, but I think it does offer some possibilities and might be worth your consideration - certainly for obtaining prevalence data on large metropolitan populations or even in smaller communities and also, perhaps most important, for giving you an opportunity not only to find out how many blind or visually impaired people there are, but being able to get data on the people who are closest to them, namely their families. How do blind children behave in families? What is the impact of the blind or severely visually impaired child on family structure, aspirations, economics, and so on? To me, in a way, this would be the real payoff of such a technique.

Here is one sample survey technique that we've developed and adapted from other studies that are going on. The National Health Survey continues to use this technique, sampling the entire American population for data on various chronic conditions.

Another study which some of you may have heard about because you were respondents in it, was sponsored recently by the American Association of Workers for the Blind (AAWB) and the American Association of Instructors of the Blind (AAIB). This project grew out of the need to learn about some of the problems schools face in providing educational materials for blind children. Conducting the study were the American Printing House for the Blind (APH) and the American Foundation for the Blind. Our assignment was quickly to complete a survey that would give the two sponsoring associations useful data on what educational materials are available and needed in schools with blind children enrolled.

In this instance, to save time and money, we used the technique of mail questionnaires. Here is what we did. Early in 1965 two sets of mail questionnaires were sent out - one to the 50 state departments of education (or similar agencies) and the other to 799 schools and school systems. Of the 799, 50 were residential schools, 18 were parochial schools, 17 special schools, and 714 public schools. This last group included all of the 450 schools throughout the country in the 1964 Office of Education Directory of Special School Programs for Visually Handicapped Children (i.e., programs with one or more full-time special teacher), and an additional list of 264 schools without special programs in states (Arizona, Montana, Kansas, Oregon, South Dakota, Georgia, South Carolina, and North Carolina) which was provided by APH and which were believed to have blind or partially sighted pupils enrolled.

As of 1 May 43 of the state departments had replied. Even more striking was the response from the schools. Altogether, 634 of the schools (79 percent) returned questionnaires to us; this was a much higher rate than we expected in view of the complexity of the questionnaire and the fact that many of our respondents were not specialists and that many of the schools were reporting on only one blind child. While the response rate was highest among the residential schools (88 percent), it was remarkably high among the public schools too (78 percent).

The schools responding to our questionnaire enrolled a total of nearly 14,000 blind children; this figure represents approximately two-thirds of the total known blind school population in the United States. There were a disproportionately large number of pupils in the residential schools - indeed more than half were in such schools - but this reflected the lower response rate among public schools and the fact that many hundreds of public schools with blind pupils were not sent questionnaires. Nearly half (45 percent) of the pupils enrolled in these schools were reported to be totally blind; as one would expect, the proportion in residential schools (49 percent) was considerably higher than that reported by public schools (38 percent). However, our figures on vision categories should be used with great caution. The reason is that many respondents were thoroughly confused by our attempt to have them distinguish between legal blindness and partial vision. That is, many reported blind pupils with more than light perception as being partially sighted; others counted their partially sighted as being blind.

Approximately half of the children in the schools replying to us were reported to be relying primarily on braille; more than a third were said to be depending chiefly on large type texts.

Residential schools appear to have a greater proportion of required texts and other educational materials for blind children than do public schools. This may reflect their greater concentration of resources on the problem of selecting and obtaining educational materials for this population; that is, residential schools are specialized; they are also much closer to the agencies responsible for producing materials for blind children - indeed, some residential schools themselves produce materials they need. However, although public schools reported fewer materials available for their blind pupils, they also failed to indicate a strong need for additional materials. Are they satisfied with what they have? Or are they uniformed about the range of materials available? Perhaps even more important, just what materials are the children in public schools using if certain texts and other materials are not available but paradoxically are also not needed? Answers to these questions will have to await further study, I am afraid.

But we did learn from our respondents - in both residential and public schools - that their greatest needs for texts are in the areas of music, health and physical education, vocational training, and manual arts. As for non-text materials, they most need science equipment, mathematical models, demonstrators and calculators, and measuring devices.

When asked to tell us about their greatest problems in obtaining texts and other special educational materials for blind children, our school respondents were most likely to mention the unavailability of texts. More specifically, they complained about the rapid obsolesence of the texts provided them (a result of quick changes by schools in ordinary texts), the lack of large type material, and the long period of time required to get texts produced and delivered to them. Residential and public school respondents were alike in their complaints.

Regarding general satisfaction with the program of producing and distributing texts and other materials for blind school children, the public schools turned out to be most satisfied (although as we saw earlier, their needs are probably greater). Once again, this may reflect their greater lack of information and expertise concerning the education of blind children. On the other hand, our residential school respondents - the most completely involved in the education of blind children - were less satisfied with what is being done.

Further details of this study will appear when the joint AAWB-AAIB committee issues its report. I would expect that however the data are analyzed, one simple, inescapable conclusion will emerge: schools with the blind children want *more* - more money to buy texts, greater variety of texts, and better distribution of texts and other educational materials. Just what changes will come in our present system for producing and distributing school materials for blind children I cannot say. But it is apparent to me at least that radical changes must come if they are to receive the educational opportunity which is their birthright.

Here then, very briefly and informally presented, are two research projects. They do not by any means exhaust the wide range of scholarship now being brought to bear to on problems of blindness. Nor will they solve all your problems. But I hope they will give you some idea of the methods which are available to you and of the results which you can expect. If I have raised more questions than I have been able to answer, that I am afraid is the fate of any investigator looking into what is still relatively unexplored territory.

REFERENCES

1. Josephson, Eric, "Screening for Visual Impairment," Public Health Reports, Vol. 80, No. 1 (1965), pp. 47-54.

A BRIEF REVIEW OF THE PHYSICIAN'S REPORT OF EYE EXAMINATION AND THE EYE REPORT FOR CHILDREN WITH VISUAL PROBLEMS*

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As sometimes proves the case, the agenda has proven somewhat confusing to me, but I do want to make a few comments. These relate to good sources of data and the problems to which others have referred, namely the absence of uniformity in recording, particularly in history or causes of blindness or visual impairment. It seems clear that the absence of uniformly accepted categories for reporting has seriously impaired these descriptive efforts in the field.

The National Society for the Prevention of Blindness has, since the 1930's, developed and distributed eye examination forms for use by agencies serving the blind. In 1962, the Society's Advisory Committee on Operational Research undertook revision of the form which could then be recommended for usage to the Model Reporting Area for Blindness Statistics. As a result of this work, the new form "Physician's Report of Eye Examination," was adopted by the committee (see Appendix A). It was recommended to the Model Reporting Area and is now in use in Connecticut, North Carolina, Vermont, Rhode Island, Kansas, and will be adopted in Utah.

The form contains the minimum items essential for identification of the blind individual, determination of legal blindness based on visual acuity, and classification of the cause of vision impairment. A great deal of committee review was devoted to the section on causes of vision impairment. The section is designed to provide adequate information on the individual's eye condition for classification according to the National Society's Standard Classification of Causes of Blindness. This is a two-fold scheme providing for classification of each vision impairment according to 1) site and type of eye affection causing blindness, and 2) the etiology of the occular condition. Thus the format of the section is devised to serve the ophthalmologist as a guide to reporting information essential to classification purposes. Its design reflects the experience of the Society in classifying the cause of blindness in more than 7500 school children, and review of a large number of report forms filed by state agencies serving the blind.

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* Permission to reprint these forms has been granted by the National Society for the Prevention of Blindness, 16 East 40th Street New York, New York 10016. It should be noted that the Eye Report for Children with Visual Problems is now in the process of revision and all requests for information or for copies of the revised form should be directed to the Society at the above address.

It is evident that diagnostic information must be sought in a very specific way. Merely asking for diagnosis will not elicit sufficient information. Thus, a thorough interpretation of content and purposes to the ophthalmologist is essential as a preliminary to sound usage.

This work closely parallels, in time span, the work of another committee of the National Society for the Prevention of Blindness, namely the Vision Screening Committee. In 1961, Dr. Albert Sloane recommended to the committee a proposed revision in report forms calculated to assure better communication between the ophthalmologist and the educator. His initial interest related particularly to the guidance of the educator by inclusion of a table of equivalent visual acuity notations, through which various acuity measurements might be related to usage of a range of type sizes varying between 3 point type (used in catalogs), and 24 point (used in large print texts).

As a consequence of this review, substantial revision was accomplished of reporting forms previously in usage; combining in a single form two previous forms covering the legally blind and the partially seeing. You will note that the report (Eye Report for Children with Visual Problems [Appendix B]) also closely parallels in content the Physician's Report of Eye Examination, again as a means of assuring greater uniformity in data collection. The only substantive differences between the two forms relate to areas in which helpful information for the educator has been added. For example, the section on visual acuity adds a notation regarding low vision aids, if prescribed, while the section on Prognosis and Recommendations adds detailed comments on such factors as use of glasses, lighting requirements, and restrictions of eye use and physical activity.

I have already referred to the table of approximate equivalent visual acuity notations, which is included on the reverse side of the form.

The form has, to date, had a good reception. It is being used in 10 residential schools, 5 state Departments of Education, and 15 local school systems. Many other states are currently considering adoption. Distribution and professional interpretation to both educators and ophthalmologists have been undertaken throughout the country in journals and other educational media.

In closing, let me thank you for the opportunity for this brief review of these forms. They are available from the national office of the Society. I trust they will, in time, make a contribution in our common research efforts.

APPENDIX A:
PHYSICIAN'S REPORT OF EYE EXAMINATION

CONFIDENTIAL

PHYSICIAN'S REPORT OF EYE EXAMINATION

FILE NO. ________

NAME OF PATIENT ________
(Type or print) (First) (Middle) (Last)

ADDRESS ________
(No. and street) (City or Town) (County) (State)

DATE OF BIRTH ________ (Month) (Day) (Year) PLACE OF BIRTH ________ (State or foreign country) SEX ________ RACE ________

I. HISTORY

A. Probable age at onset of severe vision impairment. Right eye (O.D.) ________ Left eye (O.S.) ________

B. Severe ocular infections, injuries, operations, if any, with age at time of occurrence ________

C. Were patient's parents blood relatives? ________ Is patient's ocular condition believed to have occurred in any blood relative(s)? ________

If so, what relationship(s)? ________

II. MEASUREMENTS (See back of form for standard test procedures and for preferred notation for recording visual acuity.)

A. VISUAL ACUITY

	Distant Vision		Near Vision	
	Without correction	With best correction with ordinary lenses	Without correction	With best correction with ordinary lenses
Right eye (O.D.)				
Left eye (O.S.)				
Both eyes (O.U.)				

B. FIELD OF VISION (If field limitation is indicated, test of peripheral field should be made. Record results on chart on back of form.)

C. INTRAOCULAR PRESSURE (If tension is not measured with Schiotz tonometer, specify instrument used. ________

Tension in mm. Hg: O.D. ________ O.S. ________ (Gm. wgt. ________ Yr. of calibration scale ________)

III. CAUSE OF BLINDNESS OR SEVERE VISION IMPAIRMENT

A. Present ocular condition(s) responsible for vision impairment. (If more than one, specify all but underline the one which probably first caused severe vision impairment.)
O.D. ________
O.S. ________

B. Preceding ocular condition, if any, which led to present condition, or the underlined condition, specified in A.
O.D. ________
O.S. ________

C. Etiology (underlying cause) of ocular condition primarily responsible for vision impairment. (e.g., specific disease, injury, poisoning, heredity or other prenatal influence.)
O.D. ________
O.S. ________

D. If etiology is injury or poisoning, indicate circumstances and kind of object or poison involved. ________

E. Has patient had any nonocular disease, not specified in C, which could have contributed to the vision impairment? ________

If so, specify ________

IV. PROGNOSIS AND RECOMMENDATIONS

A. Is patient's vision impairment considered to be: Stable ________ Deteriorating ________ Capable of improvement ________ Uncertain ________

B. What treatment is recommended, if any? ________

C. Is reexamination advised? ________ If so, after what interval? ________

D. Other recommendations: ________

Signature of examining physician ________ M.D.

Date of examination ________

Check if: Ophthalmologist ☐ E.E.N.T. specialist ☐

THIS SPACE FOR USE OF STATE OFFICE ONLY

National Society for the Prevention of Blindness.
Stat 1/164/5M

APPENDIX A: (continued)

STANDARD TEST PROCEDURES

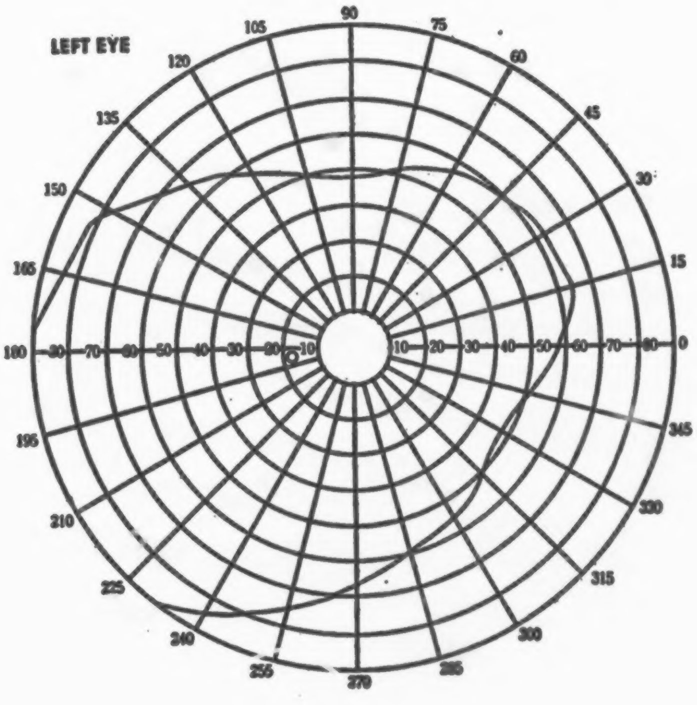
CENTRAL VISUAL ACUITY. Take measurements for each eye separately and for both eyes together, for both distant and near vision, both with no correction and with best correction with ordinary ophthalmic lenses.

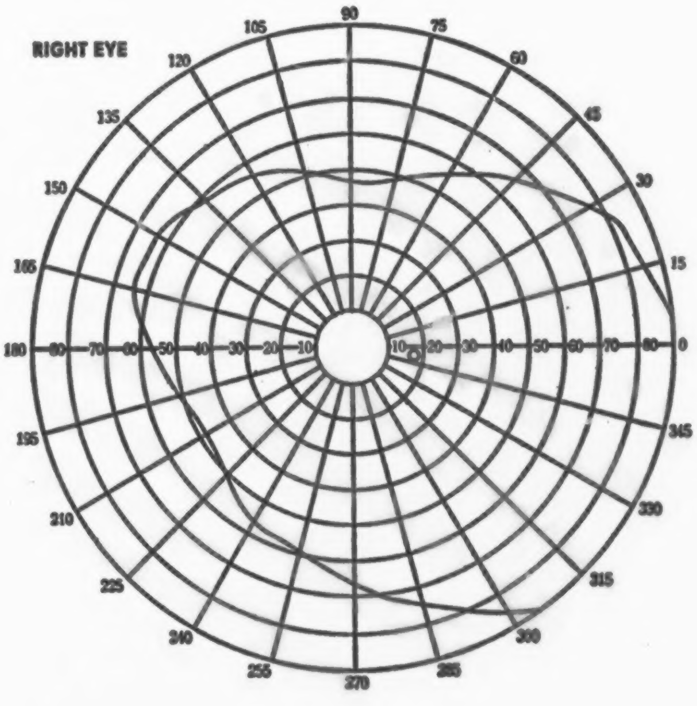
DISTANT VISION. Room illumination, 10-12 f.c. Chart illumination, 15-25 f.c. Use standard Snellen chart or equivalent. If not Snellen, specify chart used. Begin test with chart at distance of 20 feet. For acuity of 20/200 or better, record smallest test letter recognized at 20 feet as denominator of fraction and 20 as the numerator. (Examples: 20/100, 20/60) For lower acuity, reduce test distance until the 20/200 letter of the chart is recognized. Record that distance as numerator of fraction and 200 as denominator. (Examples: 10/200, 3/200) If the 20/200 letter is not recognized at 1 foot, test for best of the following four grades. Record initials of the determined grade and also the distance of recognition. (Example: HM at 2 ft.)

HM	HAND MOVEMENTS. Record greatest distance from eye at which movement can be recognized.
PLL	PERCEIVES AND LOCALIZES LIGHT IN ONE OR MORE QUADRANTS. Use bare ophthalmoscopic bulb as source of light. Record greatest distance at which light can be localized.
LP	PERCEIVES BUT DOES NOT LOCALIZE LIGHT. Use bare ophthalmoscopic bulb as source of light. Record greatest distance at which light can be perceived.
No LP	NO LIGHT PERCEPTION.

NEAR VISION. Room illumination, 10-12 f.c. Chart illumination, 20-25 f.c. Use standard A.M.A. near-vision chart or equivalent, at distance from eye at which patient's vision is best. If not A.M.A., specify chart used. Record patient's best distance.

FIELD OF VISION. Determine extent of peripheral visual field of each eye on a standard perimeter, with 7 f.c. illumination, using a 3 mm. white disk as test object, at 1/3 m. from eye. Record results on chart below.





APPENDIX B:
EYE REPORT FOR CHILDREN WITH VISUAL PROBLEMS

CONFIDENTIAL

EYE REPORT FOR CHILDREN WITH VISUAL PROBLEMS

NAME OF PUPIL ______________ (First) ______________ (Middle) ______________ (Last) SEX ________ RACE ________
(Type or print)

ADDRESS ______________ (No. and street) ______________ (City or town) ______________ (County) ______________ (State) DATE OF BIRTH ________ (Month) (Day) (Year)

GRADE ________ SCHOOL ______________ ADDRESS ______________

I. HISTORY

A. Probable age at onset of vision impairment. Right eye (O.D.) ________ Left eye (O.S.) ________

B. Severe ocular infections, injuries, operations, if any, with age at time of occurrence ______________

____

C. Has pupil's ocular condition occurred in any blood relative(s)? ________ If so, what relationship(s)? ______________

II. MEASUREMENTS (See back of form for preferred notation for recording visual acuity and table of approximate equivalents.)

A. VISUAL ACUITY

	DISTANT VISION			NEAR VISION		
	Without correction	With best correction with ordinary lenses	With low vision aid	Without correction	With best correction with ordinary lenses	With low vision aid
Right eye (O.D.)						
Left eye (O.S.)						
Both eyes (O.U.)						

B. If glasses are to be worn, were safety lenses prescribed in: Plastic ________ Tempered glass ________

C. If low vision aid is prescribed, specify type and recommendations for use. ______________

____

D. FIELD OF VISION (If field limitation is indicated, test of peripheral field should be made. Record results on chart on back of form.)

E. Is there impaired color perception? ________ If so, for what color(s)? ______________

III. CAUSE OF BLINDNESS OR VISION IMPAIRMENT

A. Present ocular condition(s) responsible for vision impairment. (If more than one, specify all but underline the one which probably first caused severe vision impairment.)
O.D. ______________
O.S. ______________

B. Preceding ocular condition, if any, which led to present condition, or the underlined condition, specified in A.
O.D. ______________
O.S. ______________

C. Etiology (underlying cause) of ocular condition primarily responsible for vision impairment. (e.g., specific disease, injury, poisoning, heredity or other prenatal influence.)
O.D. ______________
O.S. ______________

D. If etiology is injury or poisoning, indicate circumstances and kind of object or poison involved. ______________

____

IV. PROGNOSIS AND RECOMMENDATIONS

A. Is pupil's vision impairment considered to be: Stable ________ Deteriorating ________ Capable of improvement ________ Uncertain ________

B. What treatment is recommended, if any? ______________

C. Is reexamination advised? ________ If so, after what interval? ______________

D. Glasses: Not needed ________ To be worn constantly ________ For close work only ________ Other (specify) ______________

E. Lighting requirements: Average ________ Better than average ________ Less than average ________

F. Use of eyes: Unlimited ________ Limited, as follows: ______________

G. Physical activity: Unrestricted ________ Restricted, as follows: ______________

H. Other recommendations: ______________

TO BE FORWARDED BY EXAMINER TO:

Date of examination ______________

Signature
of examiner ______________ Degree ________

Address ______________

APPENDIX B: (continued)

CHILDREN WITH OTHER THAN USUAL VISION OFTEN POSE PROBLEMS FOR EDUCATORS. An informative report can do much to resolve these by interpreting the ocular difficulty in terms that can be applied to the school situation.

A changing and enlightened philosophy no longer segregates the child with less than normal vision, nor does it believe that he should be treated as an "eye cripple." It is no longer believed that one saves sight by conserving it; instead, eye work is encouraged because it has been found to result in greater proficiency. The visual task is no longer made easier with special larger print if the smaller print can be read with comparative comfort. It accentuates the positive, the vision the child has, rather than stressing the visual lack. It recognizes that some children will need special educational services.

Much superstition, idle talk, and outdated ideas about the eyes still exist to confuse the educators. For example, reading in bed does not make one's eyes weak. Reading in poor light in itself may not be comfortable, but it will not cause organic eye changes, and there are enough sound reasons for condemning long periods of television watching than to threaten it will ruin the eyes.

This report form is suggested as a tangible means for the transmission, in understandable terms, of the visual potential of the student and as a source of information necessary for classification purposes.

Albert E. Sloane, M.D., *Chairman*
N.S.P.B. Committee on Vision Screening

PREFERRED VISUAL ACUITY NOTATIONS

DISTANT VISION. Use Snellen notation with test distance of 20 feet. (Examples: 20/100, 20/60). For acuities less than 20/200 record distance at which 200 letter can be recognized as numerator of fraction and 200 as denominator. (Examples: 10/200, 3/200). If the 200 letter is not recognized at 1 foot record abbreviation for best distant vision as follows:

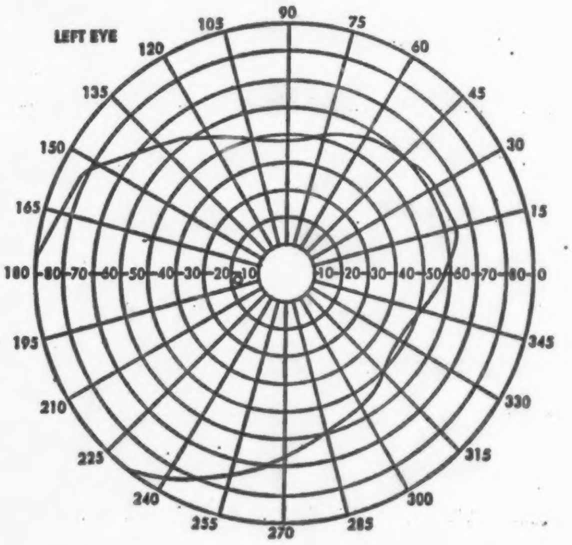
HM	HAND MOVEMENTS
PLL	PERCEIVES AND LOCALIZES LIGHT IN ONE OR MORE QUADRANTS
LP	PERCEIVES BUT DOES NOT LOCALIZE LIGHT
No LP	NO LIGHT PERCEPTION

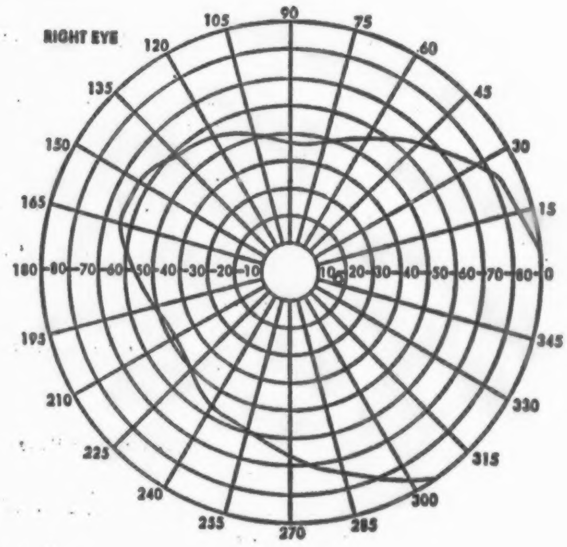
NEAR VISION. Use standard A.M.A. notation and specify best distance at which pupil can read. (Example: 14/70 at 5 in.)

TABLE OF APPROXIMATE EQUIVALENT VISUAL ACUITY NOTATIONS

Distant Snellen	*Near* *A.M.A.*	*Jaeger*	*Metric*	*% Central Visual Efficiency for Near*	*Point*	*Usual Type Text Size*
20/20 (ft.)	14/14 (in.)	1	0.37 (M.)	100	3	Mail order catalogue
20/30	14/21	2	0.50	95	5	Want ads
20/40	14/28	4	0.75	90	6	Telephone directory
20/50	14/35	6	0.87	50	8	Newspaper text
20/60	14/42	8	1.00	40	9	Adult text books
20/80	14/56	10	1.50	20	12	Children's books 9-12 yrs
20/100	14/70	11	1.75	15	14	Children's books 8-9 yrs.
20/120	14/84	12	2.00	10	18	Children's books 7-8 yrs.
20/200	14/140	17	3.50	2	24	Large type text
12.5/200 (20/320)	14/224	19	6.00	1.5		
8/200 (20/480)	14/336	20	8.00	1		

FIELD OF VISION. Record results on chart below.





What is the widest diameter (in degrees) of remaining visual field? O.D.________ O.S.________

Stat 4/664/5M National Society for the Prevention of Blindness, 16 East 40th Street, New York, N.Y. 10016

SUMMARY OF SECTION I

Robert Scott
Russell Sage Foundation
New York, New York

As I listened to the very provocative discussion here, it occurred to me that there is something misleading about the way in which "problems" that blind children have are formulated. For many years, and even today, the solution to these problems have been formulated in much the same way that medical scientists formulate solutions to problems of disease. That is, medical scientists seek ways to cure, eradicate, or control disease in order to minimize its effect on the individual. This approach to illness has been called "searching for magic bullets." To conceive the problems of blind children in these terms is, I believe, dangerously misleading. Blind children have problems which are of a different order than the problems of infectious diseases. Results of efforts to solve the problems of the former are much less clearly defined than the results ordinarily encountered in the latter. What can be realistically expected in the way of a solution to the blind child's problems is more modest than what can be expected in solutions to infectious disorders. This suggests that it is necessary to reevaluate what constitutes an acceptable and realistic solution to the problems of blind children.

It is perhaps more realistic to stop seeking cures and pretending that these problems can be completely solved, and to begin to work out methods of accommodation to the blind child's problems. To do this will require not only the imagination and dedication of those who work with blind children. It will require the active and sustained participation of trained and experienced social science researchers. If any meaningful body of knowledge about blind children is ever to develop, it will require minds from many disciplines. It is, therefore, essential that those who now work with blind children attempt to stimulate interest in the blind child among social scientists. I would recommend that one way to attract competent persons from sociology, for example, is to take the position that blind children afford unusual opportunities for studying basic problems of socialization which are of critical importance to sociology. They should be encouraged to use blind children as research subjects for the purpose of studying basic theoretical problems of sociology. This strategy will have the effect of bringing new perspectives to bear on the problems of blind children and consequently to widen and deepen understanding of them.

SECTION II

Educational Research

Chairman: *Everett Wilcox*
California School for the Blind
Berkeley, California

A PRACTITIONER LOOKS AT RESEARCH IN EDUCATION

Georgie Lee Abel*
Department of Special Education
San Francisco State College
San Francisco, California

In making this presentation, I derive comfort from the feeling that it still seems fashionable to talk in terms of philosophy and experience when it is so labeled. I should like to begin with my bias that a practitioner does have a definite place in research. He has the unique opportunity to be curious, to talk with researchers, to cooperate with them and then, through critical evaluation of their findings, to use the knowledge and stoutly call for further study. The practitioner today has the greatest opportunity to become involved in research and to defend and substantiate what he is doing on the basis of existing research and unmet needs at the present time. He can also state without shame that his practices result from a theoretical base where there is not documented evidence to substantiate his experimentation.

At the present time, the intellectually curious practitioner can become involved in committees and act as a consultant to research projects that are getting under way. The opportunities for funding are great, and I can say that my own involvement in committees, both locally and statewide, have contributed to my thinking about procedures in research and have certainly helped me to communicate with researchers who are eager to gain more knowledge about the specialized area which I represent.

My comments, therefore, will be based on experience as a direct service person who happens to be directing a research project at San Francisco State College. I spend most of the time, however, working with college students, future teachers who are chiefly trying to study the findings of other researchers as well as to evaluate the needs in critical areas affecting the education of visually handicapped children. The goal is to help students sharpen their curiosity and, hopefully, as future educators, to join the ranks of others who wish to pursue studies and desire to continue to evaluate the outcomes of their procedures.

As a practitioner, it becomes quite easy to sit back and enjoy the privilege of the feedback, the successes and failures of human begins which are often easily observable. It is all to easy to enjoy the pleasure of developing the story in the classroom and never sharing it in writing. When one reads the numerous criticisms of the dearth of educational research or the quality of it once it is written, there seems to arise a sort of timidity or resentment which stifles growth or, at least, the desire to engage in research. Experience seems to indicate that much of this feeling or apparent neglect results from poor communication between the practitioner and the researcher. Teachers have been far more interested in giving service than studying it. While educators are known to be rather careful observers and good evaluators, they have received encouragement administratively and financially only in the last few years to study scientifically their programs and procedures. For quite obvious reasons, they were strongly dedicated to service and were not seen as having an active role in research. This lofty function was performed and published by others while the cooperation in many instances was provided generously by teachers quite willing to be the unsung heroes.

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* Project Director, San Francisco State College Braille Reading Study.

The practitioner can accept responsibility for some of the criticism, perhaps for his prejudice toward the rather large number of pamphlets on musty shelves which have been completed with elaborate statistical treatment yet never translated into action. Often many of the studies were quite segmented and represented exercises which were undertaken because they were manageable or economical enough to pursue. In the field of the visually handicapped, samplings have been costly and limited. The desire to study and the importance of the topics were not explained sufficiently between the practitioner and the researcher and often prejudice occurred even before the results were available. If the conclusions were too foreign to the actual experience of those who were involved in direct service, again there were further questions and louder calls for replication of the work.

In the case of the researcher there are questions of somewhat different order. In addition to the management ease and the economy mentioned above, at times there was a temptation to wonder if the finding out had not become a sort of disease and the preservation of various statistical processes had not given the appearance of mathematical gymastics which, at least to the practitioner, seemed to bear little resemblance to useful knowledge concerning vital problems. Some have asked if the design of a given research project had not stimulated all too often a worship of a method more than a planned contribution to the much needed knowledge of value to so many people.

Obviously, there is a brighter day ahead when there are opportunities through the federal government and from private funds to really set some priorities and engage in projects of greater size and depth than the dissertations of the past which were important, but represented the first ventures for the researchers and of necessity had to be limited by the many factors of this type of required project. The difficult and more elaborate projects are now possible, but we have, as never before, the obligation to sit down with good people in design and those who desire to pursue careers in research and stimulate their best efforts. At the same time, we need also to pursue at least enough independent research to feel that we are carrying our full share of the burden. We do have the unique advantage of seeing the problems at close range and of evaluating the findings through actual observation and practice. This aspect of applying findings is all too often denied the researcher.

To be sure, we are still living with our defenses when we look at the small number of studies specific to education of the visually handicapped, but we can take advantage of research related to it. Obviously, such studies are related to technical research while we are calling for more in the important psychosocial areas. We are told that we are lacking instrumentation in these areas, that "If we can't measure it, it is not so." There are numerous other things which have tended to intimidate us more than they have inspired us. We have pretty good evidence as educators that we can not often write proposals well enough to meet the standards of the people who evaluate them. On the humorous side, I heard of a graduate student recently who stated that she was taking a course in writing research proposals, but she added that she would not get on the "publish or perish treadmill." By the same token, we hear educators saying that they wish that the goals of the studies would be as highly respected by the researcher as the design. If this were true, the researcher could take more responsibility for interpretation as well as the all-important answers when questions arise concerning the design in relation to the findings.

On our own campus, we are quite excited over some of the types of research affecting education which are under way. To see the funding of projects of an exploratory or descriptive nature encourages us. We surely are coming close to more controlled research in vital aspects of education which are not developed on a purely physical model. Perhaps we have to go through a period of careful exploration and description with the best research techniques available to us and once we have found out and described what we found, we might then even develop better instrumentation and certainly refine and control our designs. Thus, we might achieve research more like the precision characteristic of certain other disciplines. At least, we are pursuing topics of great interest to us and certainly those which are seen by us as being both needed and useful in education.

We are especially interested in the work being pursued in cognitive processes, teaching strategies conducted by Taba and her associates, and the development and norming of scales in one area of exceptionality by Levine. We have keen interest in our own braille reading project funded by cooperative research which, Dr. Lowenfeld and I hope, will provide information of value to teachers as well as some information giving clues to the manner of reading braille in relation to other factors. We are equally excited over the developments in teaching aids and indeed the exploration in various areas of the curriculum. Such research aids us in our understanding of the children and youth whom we teach and our procedures and strategies in facilitating growth.

Perhaps we are more daring in the problems we attack, but at least we are studying the problems which teachers, administrators, and others involved in the process of education are considering. We are actually exploring and conducting research with children in school settings, and we are not so dependent upon the important application of research done with animals. We are greatly indebted to the monkeys, rats, and pigeons of the past, but if we look at the present, we can see possible application of work being done with bats, porpoises, and dolphins as important areas of continued examples with the continued use of animals. At the same time that this work is undertaken, we are still conducting study with human beings, and we must do more of this.

Technological developments, particularly in computers, are also bringing about great improvements in our research procedures. Our computers and more skilled statistical consultants are providing more opportunities for graduate students in our schools of education to become excited over possibilities in research as well as in techniques. Evidence, meager as it is, shows that the few graduate students from some of our teacher education centers are publishing their first studies and some of them are continuing again through the valuable government support to actually participate in larger research projects.

Information is more readily available to both graduate students and professional people engaged in research through the large array of library facilities. Specific mention should be made of the following: the excellent contributions from the *Proceedings of the International Congress on Technology and Blindness,* and the periodic *Research Bulletins* published by the American Foundation for the Blind; the Monograph Series from the Council for Exceptional Children; such books as Kirk and Weiner, *Behavioral Research on Exceptional Children* and Trapp and Hemelstein, *Readings on the Exceptional Child;* the *Review of Educational Research* and the recent promising annual published by the American Association of Workers for the Blind, first edition, entitled *Blindness 1964.* The examples mentioned here should by no means detract from the large number of publications both representing philosophic discussions and research writings found in most other disciplines. If we are to add to the meager knowledge needed in this small but significant group, we must martial the forces of all professionals.

A meeting of this type affords a wonderful opportunity to talk as a practitioner and to reestablish the fact that we do need the researcher, and we should point out some of our problems and hope that his curiosity and his knowledge of instrumentation and design will help him to accept our challenge and thus contribute to the knowledge concerning visually handicapped children. As I attempt a summary and continue to represent my biases, may I suggest a few problems that I hope can whet the appetites of those who desire to pursue new studies of value to the educator. Briefly they are as follows:

1) The partially seeing child or the one who operates with very limited vision represents a marginal handicap that is not too well understood by those of us who work with him. Certainly the whole area of what has been called "psychovisual functioning" is important and is recognized, but the factors that affect it and the techniques by which we can help the person understand it represents a large gray area of all of us. There is need for those in the medical field and those in psychology to study much more widely. We can still count the studies of an educational nature in this area on one hand. There is promising work in reading machines and some of the technical possibilities in duplicating material are good, but we have barely scratched the surface. This group of individuals represents the largest number in the population of the visually handicapped.

2) We are gratified by the interest expressed technologically in orientation and mobility, but far more is needed of a psychological and sociological nature. I would rate the studies in the area of the self-concept, the environmental factors affecting the independent functioning of the blind person as experienced in our society and the influences in the very early years in the family, as very high on the list of factors to be of great value to educators. This area is indeed one in which the best technical knowledge as to devices and the sensorium must go hand in hand with the above mentioned sociological and psychological factors.

3) In spite of the huge number of articles, contributions from research and books concerning parent-child relations where visually handicapping conditions are concerned, we have need for much more research from the various disciplines. A generation of very young children literally crowded our agencies and schools with so much opportunity for study, and so little has been accomplished. There is much from the general fields of study which is of value and there is much support for the problems as seen by practitioners in such publications as those in the recent *Psychoanalytical Study of the Child,* publications and other sources outside the specific literature. There has been much more activity during the current period of concern for children with marked multiple handicaps. Too bad much of this did not occur earlier when there were more children who could function with less complication. The real need, it would seem, would be for more longitudinal studies. The progress or severe problems in development of children have been observed by many of us. Were there more longitudinal studies we would be able perhaps to anticipate certain problems and to provide more support or be more realistic in certain instances.

4) More studies affecting the curriculum for both blind and partially seeing children should be undertaken now that there is

greater opportunity in the school setting. What about concept formation, cognitive processes for those whithout sight? What about meaningful orientation and mobility functioning for those with low vision who could grow to use vision more effectively in given situations? What about the braille reading and writing system as it is improved technically with actual use with children and adults? What about teaching strategies as they can be sharpened to bring out that which is real and desirable for both children without sight, either cogenitally or adventitiously, and those with varying degrees of low vision which can be used?

5) What about studies of the practitioner and/or administrator who desires to serve the visually handicapped? Studies of attitude growth in positive feelings and interpersonal relationships have received some attention, but more techniques in research from sociology and psychology should be of great value as such studies are made. This is one of the broad critical areas where we have been plagued by what was called poor or inadequate instrumentation. Perhaps the work at present with the culturally deprived, and the efforts to bring about cultural change with respect to minority groups, will shed some knowledge to improve the dilemma in understanding that exists today. Perhaps as we help those who see gain greater understanding, we will be able to help those who are visually handicapped grow in an understanding of themselves which is both comfortable and effective for them.

PRELIMINARY REPORT: SAN FRANCISCO STATE COLLEGE BRAILLE READING STUDY

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The study on braille reading instruction conducted at San Francisco State College is financed by a grant from the Cooperative Research Branch of the U.S. Office of Education. The grant covers a 2-1/2 year period beginning September 1964. The study is designed to bring up-to-date our knowledge about braille reading instruction, which was last treated in 1928 when Kathryn E. Maxfield's book *The Blind Child and His Reading* was published. Since then there have appeared some research articles dealing with specific problems of braille reading and sporadic articles dealing with braille reading instruction. Many changes have occurred since 1928, among them the disappearance of Grade 1-1/2 braille and the consequent general adoption of Grade 2 braille, which is now used from the beginning of braille reading instruction; the change from the letter method to the word-and-sentence method; the advent of the talking book and other audio media; the "instant" duplication process; the growth of volunteer transcribing; the increase in the blind school-age population; and, last but not least, the changes in the teaching of reading to seeing children which also affects the teaching of reading to blind children.

The study has as its aim: 1) a description of the present status of braille reading instruction; and 2) the application of reading tests to blind students in local and residental schools to determine the essential characteristics of good braille readers, and what relationship there is, if any, between certain individual characteristics of blind children and their achievement in braille reading.

The first part of the study, the description of the present status of braille reading instruction, has been completed. A questionnaire was sent in November 1964 to all residential schools for the blind and to all known programs for blind children in local elementary schools. A total of 382 letters were addressed to persons in charge of these programs, together with questionnaires which they were asked to have answered by those who were in charge of the actual braille reading instruction in the kindergartens and elementary grades. Replies were received from 337 schools (88 percent). All residential schools replied, and 287 (86 percent) of the local schools responded. This is a most gratifying participation which is due, in part, to the fact that we kept our questionnaire as straightforward as we possibly could, and, primarily, to the active interest of teachers engaged in braille reading instruction. This interest also showed itself in the fact that more than 8 out of 10 teachers added comments in addition to the factual answers checked in the questionnaires.

A total of 362 questionnaires, filled out by 520 teachers, is the source from which conclusions on the present status of braille reading instruction are derived.

The first question asked concerned the grade level at which braille reading is begun. In local schools, as in residential schools, this is largely done during the first semester of the first grade.

The next question was, "How do you begin teaching braille reading - with the braille alphabet, with whole words, or with meaningful sentences?" About 22 percent of the residential school questionnaires and 15 percent of the local schools begin with the braille alphabet. Ten percent of the residential schools and 11 percent of the local schools indicate that they begin with the braille alphabet and with whole words. All the rest, that is, 72 percent of the local schools and 68 percent of the residential schools, begin with whole words or with meaningful sentences. This constitutes a really remarkable change, since not too long ago the letter method was almost uniformly used.

The question dealing with what grade of braille is used in beginning reading was almost uniformly answered by both local and residential schools as braille Grade 2. Only four local school questionnaires and one residential school questionnaire indicate that they still used braille Grade 1-1/2. When we sent out the questionnaires we expected that we would find some rather important pockets of braille Grade 1-1/2 instruction. The fact is that they are not in existence, and that braille Grade 2 is generally taught from the beginning.

We asked the question, "With which hand do you encourage children to read?" Eighty-six percent of the local schools and 85 percent of the residential schools encourage the use of both hands.

The question dealing with what fingers children are encouraged to use in reading was answered differently in local school questionnaires and residential school questionnaires. This in fact was the only real difference we found between the two types of educational facilities. The index fingers of the left and right hand were given by 67 percent of the residential school questionnaires, but only by 36 percent of the local school questionnaires. One-third in residential schools and almost two-thirds in local schools encouraged the use of other fingers or combinations of them.

Then we asked, "When do you introduce braille writing?" About 35 percent of the questionnaires in both types of facilities indicated that they do so at the same time as reading. The other answers are divided between "after some reading skill has been developed" and "according to the child's individual level of ability," or a combination of these.

The last question we asked was, "What do you use to teach beginning writing?" Almost uniformly the braillewriter was checked. Only four local school and two residential school questionnaires indicated that slate and stylus were used, and there were two residential school questionnaires which volunteered the information that pegboards and pegs were used.

We also added questions asking who provides initial instruction in braille reading. In the residential schools it was naturally the classroom teacher in most of the cases, but in 10 percent of these schools special braille instructors were also indicated. In local schools 51 percent resource teachers, 29 percent itinerant teachers, and 8 percent each of special braille teachers and classroom teachers were indicated.

As can be seen from the above outline of the present status of braille reading instruction, there are no essential differences in methods between local and residential schools which would either justify or make it possible to establish different method groups. Neither are the differences significant nor are the numbers sufficient. For this reason, the second part of the study will deal with the problems of reading rate and reading comprehension of braille readers, and will compare braille readers with norms for visual readers. Also, the results obtained from residential and local schools will be compared.

We still assume that braille reading takes two-and-one-half to three times as long as visual reading. This was established when braille Grade 1-1/2 was widely used. Now all our braille readers read braille Grade 2, as Mr. Davis has pointed out, and this should be sufficient reason for a change in the "two-and-one-half to three times" rule. We also want to know how reading comprehension on different grade levels in facilities for blind children compares with that of seeing children, and how blind children in residential schools and those in local schools compare with each other.

In the fall of this year selected teachers in local and residential facilities for blind children will be asked to administer the Sequential Tests of Educational Progress (Reading part only) and the Stanford Achievement Test (Reading Comprehension only) to fourth and eighth grade students who have a visual acuity of 5/200 or less. We hope to have about 300 students tested. The results of the test will be used to determine reading rate and reading comprehension data.

The test material will be accompanied by a student information sheet for each student. In this, the teacher will have to describe by checking certain characteristics of the student, such as the student's vision, the age at which he became blind, which hand or hands he uses in reading, how he uses them, what his reading fingers are, etc. These will be correlated with achievement in braille reading so that characteristics of good braille readers can be determined and eventually be incorporated as a part of braille reading instruction.

To supplement and consolidate information gained from the survey part and the test part of the study, a workshop will be held at San Francisco State College of experts in braille reading, that is practitioners of braille reading instruction. The results of the study and other problems of braille reading will be discussed by them before the writing of the planned book on braille reading instruction is commenced. The urgent need for such a book was confirmed by the many comments which were attached to the replies to our first survey, which all expressed a need for an up-to-date treatment of braille reading instruction. Two such comments exemplify the trends of all of them: "I am very happy that you are doing this research because I had to learn it all by practical experience," and, "I am glad that you are doing this research because now I will know whether what I am doing is right."

EDUCATIONAL PROGRAM FOR BLIND CHILDREN WHO ARE EMOTIONALLY DEPRIVED AND/OR RETARDED

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In trying to determine what would be of the greatest interest to this group concerning the project we have with multihandicapped, blind children, I stopped to think of the questions that have been most often asked concerning this project. I decided that this group would be different, but if they were not, they would ask the following three questions in this order: 1) "How much money did you get?" 2) "How did you get it?" and 3) "What are you going to do with it?" For people who ask questions in that order, I usually say that we got 60,000 dollars in the first year and we will get the same amount in the next two years. We spent three to six months writing an application; we don't know what we are going to do with it, but we're going to do something - and that usually ends the conversation.

For people who have a real interest and who want to know more, I will try to give you a little bit more. Actually, we spent three to six months writing and rewriting an application, and drawing on our several years of experience with multihandicapped blind youngsters. It is a major accomplishment in itself to get one of these applications off your desk and into the hands of someone who can do something about it. We aren't staffed to do this kind of thing. I have found myself in a position of having no experience in it, and greatly appreciated the efforts that were put forth by my own supervising body, the Oregon State Board of Control. They have employed a research coordinator and he, having experience in this area, helped us quite a bit with our application. We submitted a demonstration proposal to the U.S. Commissioner of Education, under the division of Title III, Section 302, of Public Law 88-164, entitled "Development of Residential Educational Program for Emotionally Deprived Pseudo-Retarded Blind Children." At a hearing concerning our budget in Washington, D.C., we were told, "You'll have to change the title because the senators who appropriate money will never understand it." I'm not sure that I did either. The project now is called, "Educational Program for Blind Children who are Emotionally Deprived and/or Retarded." It was submitted through the Oregon State Board of Control, which operates the school in Oregon. One of our teachers and I are listed as the principal investigators. The proposal asks that we set up a demonstration program for a very limited number of youngsters. I would like to give you a little bit of background about the school and its location, then define the problem and begin to answer the question, "Who are these children?"

The Oregon State School for the Blind now enrolls students from Alaska on a tuition basis and in our proposal we stated that we could serve children from Washington and Idaho if programs for multihandicapped blind youngsters or emotionally disturbed youngsters were developed on a regional basis. However, we feel we have enough in Oregon to be concerned about at this time. We utilize consultative resources from the University of Oregon Medical School for diagnosis and treatment. The school employs a trained social worker, part time clinical psychologist, and a pediatrician, and maintains an infirmary with a trained nurse in addition to specially trained houseparents and teachers. Our seven-acre campus provides for a variety of experiences, including swimming and other recreations. We're located within the immediate area of the city of Salem, a town of 60,000. We're within a short distance of three large universities and six smaller colleges.

For several years the school has admitted a number of multihandicapped blind children. Some of these children have disabling neurological conditions along with blindness. Many, however, have no detectable neurological difficulties other than blindness, yet they display severe social and behaviroal defects. For example, many are unable to carry out the simplest directions, some cannot dress or feed themselves, some have no capacity to use language and persist in echolalic utterances, some are virtually immobile unless urged to change positions, some are extremely sensitive to noise, while others vocalize or express nonpurposeful movements continually. I think we all know youngsters like these. This type of youngster usually is excluded from school, for he is considered generally incapable of responding to academic material and is disruptive in the classroom. The typical diagnostic label attached is mental retardation.

We believe that some of these children are emotionally deprived. They are not really retarded, but merely appear to be so; when given highly individualized care and attention they could be maintained in school rather than restricted to home or admitted to institutions for the retarded. Our experience in this regard has been most rewarding. It is illustrated by two case reports which I will present to you. The program proposed in our application is designed to identify the children that are not actually retarded, but appear to be retarded, from the larger number of multihandicapped blind youngsters, and to develop a treatment scholastic program for them.

The first case study is of a child we'll call Mary. See if this doesn't ring a bell for some of you. Mary was born in August 1951. Pregnancy and birth were described as normal. Diagnosis: blindness, probably a central nervous system loss. In October 1959 Mary was examined at the Menningers' Clinic. Her physical development was advanced for a blind child, but slightly slow for a normal child. She had more than the usual trouble in chewing food, her speech development was slow, she exhibited a behavior pattern of bouncing, rocking, eye gouging, head hitting, and screaming. She pinched and bit other children, but would not play with them. The summary of the psychological testing was:

> "Mary is a blind child who is functioning on a rather severe retarded level, but with an irregular pattern of functioning. Apparently she is able, comparatively, to differentiate details on a much higher level in the auditory than in tactile, kinesthetic areas. Her highest achievements are the reproducing of tall patterns and defining words. Her memory, comprehension, capacity to abstract, et cetera, are on a comparatively low level. Diagnosis: intellectual retardation and emotional problems. Psychiatric syndrome: 000-Y 903. Mental deficiency: idiopathic severe. IQ: cannot be determined accurately. Prognosis: the degree to which Mary can be trained and subsequently helped to be more self-sufficient and self-satisfing will depend a great deal on what facilities can be obtained for her. It would seem most likely that an adaptation which might be made in a school for the blind to help a retarded child would be most useful. It seems unlikely that she will ever be able to function at a much higher intellectual level."

In October 1961 Mary was given a WISP test. The results: Verbal IQ 56.

By the end of nine months in a special class in our school, Mary was beginning to read at a primer level, to write words, short sentences and numbers in braille, to enter into simple games with classmates, and to overcome most of her objectionable behavior. At present, one year later, her teacher reports Mary is at second grade level with some comprehension, that her book memory is too good (it interfers with reasoning), she does number concepts in 'teens, her spelling is excellent, she can write braille letters without help, she is developing concepts, and is able to make simple transfer of ideas from concrete to abstract.

The second case study is that of a child named Gary. Gary was born December 1951, two months prematurely. He weighed two pounds and eleven ounces, and was in an incubator for six weeks. The condition known as retrolental fibroplasia developed, resulting in blindness. His early infancy was marked by frequent colds, and respiratory difficulty. He also had rickets. Consequently, Gary spent his early childhood in a crib and not in normal activities. Two years after entering the Oregon School for the Blind, at age seven, Gary was seen at the Oregon Fairview Home and tested by the psychologist there. A summary of the report reads:

> "In most respects he appears to be functioning between the two- and four-year-old level. This is true when compared to other blind children of his own age. It is very difficult at this time to ascertain the exact cause of retardation, but the possibility of organistic origin cannot be ruled out; however, his behavior and mannerisms are highly suggestive of emotional disturbances due to possible rejection. He will require a great deal of extra attention and affection. He should have someone with whom he can establish a close intrapersonal relationship, since he needs to feel wanted. It is recommended that he continue at the school for the blind, at least for one or two years, and that an effort be made to establish a more personal relationship before any further efforts at psychological evaluation or diagnosis are attempted."

At eight years, one month, Gary was given the WISP intelligent scale for children. Verbal IQ was 55, and he was classed as mentally defective. Following this, he was tested at the Crippled Children's Division of the University of Oregon Medical School in connection with an evaluation made for a prematurity study. Again he was given the WISP test, and this time rated an IQ of 65 on the Verbal scale. On the Liman test he functioned on the three-year level, the score being SA = 30, SA = 34, (the usual score for blind children being 60 and 70). The psychologist's comment was, "Could profit from training, but would obtain limited benefit from a formal education."

At the present time, Gary is doing advanced primary academic work. His teacher reports he is functioning on a level comparable to sighted children in the latter half of the second grade. In some areas he is beyond this point and in some he is not. However, this is excellent progress over the prognosis previously considered. In a nine-month period he has progressed from a withdrawn, silent, inactive child to a little boy who is reading at first grade level, enjoying and laughing at the jokes in his stories, talking, and wrestling with his classmates. He still has a long way to go to become a normal functioning blind child, but at least a beginning has been made.

These children are not children that are included in our current study. They are children who we have had experience with and that we used to substantiate our feelings that progress could be made.

Now let's talk more about the children that are in the program. Some of the children that we're talking about exhibit a severe aversion for any vocal or tactile stimulation. We have found it necessary, as have other schools, to exclude or remove them from school. We have established a program over the past few years in which we have enrolled these youngsters. It was on this experience that our application was founded. The program proposed in our application representated a radical departure from the regular program at the school, and also went beyond the program that we have developed over the past few years, both in the number of children to be involved and in the counseling and instructional method to be used. Children are removed from the regular stream of noise and steady activity until they are ready to tolerate and profit from the stimulation, and use it to their advantage, rather than to have it force them further into withdrawal.

The program is scheduled for a twelve-month rather than a traditional nine-month school year. Our experience has shown that progress made in the regular nine-month year can quickly be lost in the two-and-a-half to three-month summer, if the child goes home and does nothing. Contact between the child and his parents, in some cases, is limited until the child can integrate the experience comfortably, and until the parent can learn to contribute to the child's growth and happiness, if the conditions indicate that the home situation was, in part, the cause of the trouble. On the other hand, regular contacts are maintained between the project staff and parents. These contacts are carried on in both the home and the school.

At the time the child is accepted into the program, he is given a thorough diagnostic examination. This includes separate educational, medical, psychological, and psychiatric studies. These studies are geared to report objective scores, insofar as possible, and also a description of basic developmental behavior. Supported by these studies immediate and long term educational and social goals are defined for each child. The child's progress is reviewed every two months (not each six months, as stated in our original application), oftener if necessary. A maximum of ten to fifteen youngsters between the ages of four and twelve are in our group. The children enrolled are characteristically deficient in their ability to identify and relate to objects, persons, and activities. The educational task with these children is to make such identies useful and desirable to the child; to help him associate the more meaningful attributes of objects, persons, and activities with their name and labels; to perfect his recognition and retention capacity with respect to language symbols; and to encourage the realistic use of personal relations, activities, and objects in the child's daily adaptive behavior.

We have established what we call a teacher/counselor role with these children, and it's different from what you might expect with other children. For example, this person needs to accept children who are noisy, yet she must protect them from other children's noises when these are detrimental. She must welcome the child's embrace, and yet exerise restraint on her own affectionate impulses. During the first month on the program, the children are involved in the assessment of the problem, in becoming familiar with the staff, in the considerable opportunity for free play in the company of other children. As part of the formal assessment activities the teacher/counselor observes the child for his more typical distress and more pleasurable responses. Special attention is given to documenting those stimuli which tend to frustrate and irritate the child, as well as those which would make convenient reward or reenforcement agents in the education training program. Our limited experience has suggested that special classrooms or social privileges have less utility in shaping this kind of problem child behavior that it does for normal children.

Thus, we are slowly trying to harness the child's individual interests and pleasures into his educational program. In other words, we're backing 'way down in assuming that nothing is appropriate here until we get some indication from the child, through his behavior, that this means something to him. Then we begin to build from that point. We like to say we're really emphasizing his "areas of wellness," or those things that have meaning to him. In the educational program of general study and living experience, planned and being described for each child, generally simple discussion procedures have little place. Demonstration methods have some value for some children, while others need freedom to explore for themselves.

In sum, the teacher/counselor will need to be sensitive to the individual child's mastery of skills and knowledge, using the appropriate mixture of demonstration and freedom.

The goal of the program is to enable the child to function normally in the regular class at the school. An assessment of each child's progress, and an analysis of the factors being observed, lead to a number of significant questions.

1) Can sufficient stimulation be provided through usable senses to insure adequate neurological development?

2) What types of stimulation will best promote normal development?

3) What factors are meaningful in determining the type of child this program can benefit?

4) What criteria can be established to determine the readiness of this child to leave the program, either to go to the regular school or to some other situation?

5) What psysical, social, psychological, and developmental levels of behavior change have been observed as related to time interval sequence?

Details and complete anecdotal records are kept daily by all persons in contact with the children. In addition, daily consultations are held, and frequent conferences review and evaluate information collected. Periodic analysis and review of this material by a group of consultants and research analysis should give us findings, help us find answers to the above questions, and suggest modifications needed in the program.

I know that this report is spotty. It is hard to give actual progress because, like other studies, ours has just started and it takes an awfully long time to run twelve children through the clinics. These children have been going through at the medical school to get the evaluation started. I don't mean to imply that we're waiting for this to be done and that we're not doing anything in the meantime, but we are pretty much involved with that type of activity right now. The staff of the program maintain their direction and their enthusiasm through a regular program of conferences, consultation, and supervision.

Let me review and restate in simple terms the overall objective of the program. It is really to design a therapeutic school program for the multihandicapped blind child. The purposes of the program will be: a) to identify those children, who can profit from such a program, from among the large group of multihandicapped blind children; b) to develop medical, psychiatric, psychological, and educational evaluation procedures which will help make it possible to identify good prospects for special programs; c) to maintain these children in the special program only so long as they require its protective benefits, and to move them into regular classes as soon as possible; and d) insofar as possible, to avoid the institutional transfer of the multihandicapped blind child to the mental hospital or to a home for the retarded.

RESEARCH NEEDS IN EDUCATION FROM A TEACHER'S VIEWPOINT

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INTRODUCTION

Most classroom teachers, even the best ones, stand in awe of The Researcher. The true researcher is one set apart from the teacher in training, methods of working, and above all in the language he uses in most of his speaking and writing. The researcher is proud of this difference and rightly so. He is a specialist.

The teacher of the blind and partially seeing is trained to serve the child's special needs in so far as is possible. There is awareness of the fact that much research needs to be done in this field if services are to be improved. However, being very sure of this fact, the teacher is equally sure that a team approach for working must be developed between the researcher, himself, and individuals who might be involved with the child. A big "gap" in working and understanding must in some way be bridged.

Research in this field, to date, has been meager in comparison to other areas of special education. This is especially true of the child with low vision. We need to get together, roll up our sleeves, and work!

We have been given ample chance to acquaint ourselves with the research now available and that in progress through materials provided us by Dr. Graham well ahead of this meeting. People interested in the blind child, and his research needs, from various agencies in California have been invited to sit down and talk together. Certain specialists from afar have been brought to the meeting. Perhaps this meeting will result in further bridging of the existing "gap."

Now is my chance, as a teacher in California, to voice research needs that have been evidenced by the blind child on a day-by-day work basis. Here is an opportunity to give examples of the observed needs, pose the problems in developing research from a teacher's standpoint, and speak of the search for the who, how, where, and when to begin work.

OBSERVED RESEARCH NEEDS

Those of you who know me know that I am, and have been for many years, concerned with the "legally blind child" who may or may not be "educationally blind." This group of children would include those with visual acuity of 20/200 to possibly 2/200. As a practicing teacher, I feel that our understanding of how to meet this group's educational needs is not yet complete.

Research with this group might involve investigation in four or five main categories:

1) the preschool child, visual acuity, how the child functions, and the possibility of improved functioning under careful supervision;

2) development of improved techniques of determining school placement in terms of modes used for reading and writing;

3) development of improved methods for close follow-up after placement;

4) study of learning channels used by seventh and eighth grade students in public schools who were taught braille early while functioning in a classroom of sighted children using print.

Jones (2) and Barraga (1) have recently completed research which would seem to point to the necessity for further study of the child with low vision. No more needs to be said here regarding the findings.

Teachers from many programs over the United States have been observing the manner in which some children function, visually speaking. Children with extremely low vision *do* read print and write as well as seeing companions in many cases. The children seem to defy all expectations in these accomplishments. This is done in spite of the doctors and teachers who are sure they cannot.

It's time we quit being sure about what the low visioned child can or cannot do. Let's help the child to find out what he can do, rather than hinder him by our preconceived ideas and attitudes.

EXAMPLES OF OBSERVED RESEARCH NEEDS

In a county-wide program, from 1953 to 1964, 37 children with visual acuity ranging from 20/200 to 20/400 have been carefully observed.

Out of this group *4* read both print and brille, *33* read print of varying size, from 24 point to newspaper print.

The educational ratings, by the classroom teacher and the special teacher, in the final analysis were: 11 excellent; 20 satisfactory; 6 poor.

During the period from 1953 to 1964, as evaluations were gathered, some of the children moved up from "poor" to "satisfactory" and on to "excellent" under the carefully planned program. Some of the younger ones are still improving, slowly but surely. Some seem to remain stationary, as might be expected.

Three children improved both visually and educationally, to the point that they were dropped from the program, *2* are deceased, and *8* moved away. In most cases we have been able to keep track of these children.

Out of this group *10* used magnifying devices to some extent. Only *1* makes continual use of magnification devices.

Two children are now classified as emotionally distrubed, *1* extremely gifted, *1* mentally retarded, and *4* are multiply handicapped.

Visual functioning or performance, size of type, type of eye difficulty, and social adjustment were noted and taken into consideration by school personnel. This in no way could be considered research. However, the information gained through clinical observation does pose a challenge for research. Ten years ago these children would have automatically been taught braille in most programs. Placement would have been made solely on information obtained from the visual acuity report from the doctor.

A fifth area in which research is needed for blind children in California is that of the use of low vision aids of all types. There are at present several low vision clinics, but the clinics do not function in close connection with the schools in most cases.

It would appear that a traveling low vision clinic, well-equipped, well-staffed, and working in schools, might possibly be used to good advantage. Much needed research could be accomplished with ease by such an arrangement.

It is recognized that low vision aids and magnification of all kinds are legion. We also know that these aids should not be considered a panacea for all children with seriously impaired vision. However, we do *not* know for whom or at what age this added assistance in seeing might really work. We need to try to find out.

The group of whom I have spoken might not, in the final analysis, be considered blind. However, the child has to prove himself, visually speaking, before he is able to be classified as anything other than blind. Actually the child is in a state of limbo: he is neither totally blind nor can he be considered partially seeing, with his low visual acuity, until he has proven he can read print.

There is so much that remains to be learned about all blind children, but the challenge this particular group brings to us is manifold. Until recent years we were not even aware of the challenge, so we have far to go.

The group of blind children from 2/200 to total blindness poses many research challenges too. We know that the mode of reading and writing should include braille. We also know that the child must learn techniques for orientation and mobility if he is to perform adequately in the world in which he lives. We can begin his education, and research concerning improvement of his education, because we know "what he has" and "what he has not."

There are others here more able to speak of this group than I. The needs of this group are in good hands. I speak of the group I know best, and that I hope some of you will wish to get to know it better in the near future.

PROBLEMS IN DEVELOPING RESEARCH FROM A TEACHER'S VIEWPOINT

The problems inherent in developing research in the area of the low visioned child are multiple, at least from a teacher's viewpoint. Perhaps this is not true where the researcher is concerned, but it probably is, at least in some instances.

1) The research design must be prepared. This is not a problem for the researcher. It is elementary. To most teachers it is not. It is a real problem.

2) The teacher knows of some instruments that are available which can be put to good use in the research ideas presented. However, good research would necessitate development of more instruments.

3) The teacher is sure that research of this type must include the researcher, the doctor, and school personnel, possibly even others.

4) Released time would be needed for at least three of the people. Time the researcher does have. The teacher and doctor do not have this time except through special arrangement.

5) The final analysis of the research poses a problem for the teacher. However, this is the researcher's field, and in a cooperative effort no longer remains a problem.

All the developmental problems in a cooperative arrangement appear to disappear except that of adequate tools or instruments with which to work. It is to be hoped that this problem will not prove insurmountable.

THE SEARCH FOR THE WHO, HOW, WHEN, AND WHERE TO BEGIN WORK

The teacher interested in research, for the purpose of improving educational procedures in working with the blind child, knows in general the personnel who should be involved. Knowing where to find individuals sufficiently interested to do research is another thing. The search for the "who" to initiate, design, and work through the research in a cooperative effort may be a long and frustrating experience. It may be necessary to tell the story of need many times before the "who" to take the lead is found.

Once the "who" is found the search for the "how" begins. This search, at least from the teacher's viewpoint, does not appear to be so difficult because now there are *two* people working toward the same goal. Each worker has a special know-how to bring to the search for how, where, and when to begin work.

Today, as never before in the history of education, research is being encouraged. Large grants of money are being awarded. Colleges, universities, state departments, and county school offices are adding research directors to the school staff. Everyone is interested in research of some type. It would appear that *now* is the time for worthy research ideas to find fertile soil in which to grow. The search for who, how, where, and when to begin work on research concerning the child with low vision may soon reach fruition. If so, the child will eventually come to enjoy more complete understanding and improved educational opportunity.

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STANFORD OHWAKI-KOHS TACTILE BLOCK DESIGN INTELLIGENCE TEST FOR THE BLIND

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DESCRIPTION OF PROJECT

Purpose: The purpose of the project is to contribute to the development of meaningful instruments for the measurement of the intelligence of blind persons through the refinement and field testing of the Ohwaki-Kohs Tactile Block Design Intelligence Test for the Blind, and to supplement the existing adequate clinical tests, which are essentially tests of verbal ability, with a nonverbal performance test. The specific aims are to: a) improve the physical form of the test toward better tactual discriminability and durability; b) to modify test administration procedure toward better standardization; c) to rewrite and to bring up-to-date the Ohwaki-Kohs' Manual; d) to determine the validity of the Stanford revision by statistical and observational procedures; e) to determine the reliability of the Stanford modification of the test by split-half and retest methods.

JUSTIFICATION OF PROJECT

The Vocational Rehabilitation Problem: Ultimate vocational success is the objective of any vocational rehabilitation "plan." The selection of the most suitable vocational objective is the most important step in the counseling process. The measurement of the rehabilitant's intellectual capacity to achieve his objective is frequently the most difficult, if not impossible, technical procedure confronted by the counselor of blind persons. The Wechsler Adult Intelligence Scale, the Wechsler Intelligence Scale for Children, and the Stanford-Binet Intelligence Scale when used with children, offer suitable verbal tests which correlate well with academic achievement and vocational performance on the technical, professional, and managerial levels. Children and adults who have not yet completed significant amounts of academic work, who have been deprived of normal educational experiences, or who because of cultural or language differences, all may be expected to perform poorly on these tests. Whatever their performance, the IQ obtained is a measure of achievement in spite of deprivation, but is not an objective measure of potential learning ability since the degree of deprivation cannot be quantified. As yet, no standardized nonverbal performance scale has been available to measure the intellectual capacity or learning ability of blind subjects. It has been noted by many authorities that blind persons who are exposed to educational experiences in the Western culture, whether in school or elsewhere, frequently perform well on verbal tests while having less than average ability to cope with vocational and other activities of daily living. In such cases, high IQ's obtained from verbal tests can mislead the subject and the couselor into setting inappropriately high occupational objectives. Conversely, low scores may result in a poor job adjustment or a rehabilitation failure.

The authors of this project feel that narrowly construed vocational objectives are inadequate goals for individual vocational rehabilitation plans, currently, and will progressively become more inadequate. Chronic unemployment in our society is obviously becoming a normal situation and will change only toward a higher percentage of unemployment as automation and cybernation inevitably advance toward the elimination of physical and mental toil in our society.

It is evident from the relatively high level of "unemployability" among persons who are blind that society has already accepted the reality of vocationally nonproductive elements. It has also accepted responsibility for planning to meet their subsistence needs, some measure of their human and social needs, and to utilize them as consumers. The vocational rehabilitation problems of the future must merely be viewed as being broader and as encompassing the problems of individuals in quest of satisfying and productive occupation whether or not a significant portion of their efforts and time are spent as wage earners, since they will wish to be contributing some kind of return to society.

Commonalty of the Problem: While the specific nature of educational and cultural differences which affect test results may vary from state to state and region to region, the general problem is known to exist throughout this and other countries. The development of a nonverbal test with a minimal responsiveness to educational and cultural differences, and with normative data for identifiable groups having age, sex, education, cultural, and occupational differences, should assist all professionally qualified clinicians to perform more accurate evaluations of the intellectual capacity of visually disabled persons.

REVIEW OF THE LITERATURE

Many other investigators have given serious considerations to the use of some form of performance test for the measurement of the intelligence of blind subjects. Most of the interest has been among clinicians who are faced with the problem daily, but who do not have the time, facilities, nor experience to design and pursue scientific investigations. Others have not published valuable data, even if collected on small populations and under ambiguous circumstances. An example of this are various attempts to utilize the "Wiggley Block" as a measure of intelligence. Various workers have been encouraged, but have not pursued their work with "form boards," some of which have been standardized as parts of test batteries and found to be equally useful with some blind subjects.

A notable exception is the careful work done by Mary K. Bauman on her "Non-Language Learning Test" from material used with Children (1). Studies now being prepared for publication by Bauman indicate low positive correlation with the Wechsler Verbal IQ and rather clear differentiation between successfully employed and unemployed blind groups.

Tiffin's "An Investigation of Vocational Success with Blind" (8), *Tear's* "Correlates of Adjustment to Visual Disability" (7), *Shurrager's* "A Haptic Intelligence Scale for Adult Blind" (6), and *Rubin's* "Abstract Functioning in the Blind" (4), all confirmed the general approach proposed here and supported the need for further investigation. Unfortunately, none of those projects had experimental apparatus immediately available for distribution, although Shurrager's Haptic Intelligence Scale (HIS) apparatus has reportedly been selectively distributed. Thus far we have been unable to procure the apparatus which should contribute much to our project so far as technology of apparatus construction and manufacture are concerned.

The field, then, would appear to require much additional work with various three-dimensional instruments, larger populatious, and more careful identifications of groups as to their visual, educational, vocational, and social characteristics.

METHODOLOGY

Time Table (First Year)

Experimental use of the present form of Ohwaki-Kohs' tests and the development of physical and procedural modification to eliminate observed difficulties.

The selection of other performance measures which can be standardized, such as a test of visual imagery and a test of travel abilities, for future correlation purposes.

The development of an information record for the collection of personal data presumed to be relative to the probability for success in vocational rehabilitation. It would also contain the identifying information necessary for classification into normative groups.

The development of referral sources and arrangements for examining subjects through the cooperation of local agencies and schools, state rehabilitation agencies, schools for the blind, and other institutions, all of which have indicated their willingness to cooperate.

The administration of the Stanford-Ohwaki-Kohs modification of the test, and whatever other performance measures are decided upon, and the completion of the information record on 100 subjects.

The gathering of medical eye information on each subject and the classification of the information by the project ophthalmologist for assignment to standardization grouping.

Submission of the data to simple statistical treatment designed to yield correlation among the various measures of intellectual performance. Relevant observations concerning problems in learning and methods of learning will be summarized and scrutinized for any potential value as diagnostic indicators, which should be formally included in the future research for further development and verification.

A preliminary review of the data, recommendations, and conclusions to be formulated into a progress report.

PREVIOUS WORK DONE BY APPLICANT ON THIS PROJECT

The chief psychological consultant and several other consultants were directly responsible for the basic research resulting in the original Kohs Block Design Intelligence Test and the Ohwaki tactual modification and subsequent developmental work. The project director and other consultants have worked on similar projects, the most significant of which was the "Anderson Tactual Modification of the Raven's Progressive Matrices."

The Kohs Block Design Intelligence Test was originally developed nearly 40 years ago by Samuel C. Kohs. He developed it in his doctoral dissertation in psychology at Stanford University under Dr. L. M. Terman. It was subsequently published, and has been widely used as a measure of intelligence and as a sensitive diagnostic instrument. The original test consists of 16 patterns to be reproduced in colored blocks. Wechsler adopted 5 of the designs as a subtest in the performance scale in his original test; however, only 2 of the Kohs designs were used in later revisions.

From 1956 to 1958, Dr. Ohwaki developed and tested his modification of the test for use with blind subjects. He found it to be very useful as a clinical instrument in evaluating the intellectual capacity and methods of learning of blind school children in Japan. He obtained correlations of 0.85 for its validity by comparing test results with teacher evaluations of the students. Other investigators are continuing to use the test in Japan with similar results.

The principal investigator coordinated and supervised the examination of a group of subjects for the Anderson project. He provided the subjects from the special education classes of the public schools in the Bay Area and from his contacts with blind rehabilitants, most of whom were employed and many of whom were his counselees in the Division of Rehabilitation Medicine. He also provided, oriented, and supervised, Helen Belz, Stanford graduate student, who worked as psychometrist. He has also been involved in various other researches in the general area of psychological aspects of blindness, the most important of which were Sargent's work on the validation of her "insight" test for use with the blind, Unkefer's study of music therapy as a modality in the rehabilitation of the blind, Cholden's investigation of the use of psychiatry in a rehabilitation center for the blind and Eaton's study of "Beauty for the Sighted and the Blind" (2,3,5,9).

ACTIVITIES OF THE PAST YEAR

Essentially following Anderson's format, an "Information Record" (Form A) was designed. Some 30 essential bits of information are recorded, falling into 8 significant categories.

"Record of Specialized Services Offered to the Blind Only" (Form B), makes a special effort to identify and record the services to which the research subjects have, at least, been exposed.

In the absence of an objective measure of performance with regard to adaptive behavior in activities of daily living and mobility, "The Stanford Rehabilitation Sophistication Scale for Use with Blind Youths and Adults" was developed.

The experimental instrument of 120 items was compiled from an inspection of the literature on blindness, the items in the Vineland Social Maturity Scale, and certain unpublished experimental instruments designed by Dr. Helen Sargent.

In that this research is basically concerned with performance intelligence testing of adults whose tactile sensitivity is known to vary, "A Test of Tactile Discrimination" was developed. This test requires the subject to discriminate between two grades of sandpaper on six levels of difficulty.

In accordance with the first objective of this project, the Ohwaki form of the Kohs test is to be used without significant modification in order to verify our assumptions concerning inadequacies of the apparatus. To put the newly purchased Ohwaki blocks and designs into immediate use, it was obvious that regluing, brushing up, and stiffening of several of the fabrics used would be necessary. Twenty-five subjects have taken the test and it is planned to continue with the administration of this form until the projected group of 100 has been seen, or until a more satisfactory set of test

apparatus can be designed and made available. As was anticipated, the Ohwaki apparatus is showing notable signs of wear, requiring constant repair, and is not satisfactory when used with adults whose tactile discrimination is either impaired, or not yet developed to a functional level following the loss of sight.

In accordance with the second objective of this project the Ohwaki procedure, as described in the English translation for the administration of the test, was modified so as to perfect applicable English, eliminate ambiguities, and specifically provide a maximum opportunity for the subject to familiarize himself with the test apparatus. Instructions to the administrator and the subject have been modified and appear in different colored type.

In considering the various factors of abilities which might be necessarily possessed by a blind subject to perform a tactile block design test, imagery was hypothesized to be important. Further, it was also hypothesized that the Ohwaki-Kohs test might be a good measure of imagery ability. The importance of imagery with regard to performance intelligence is assumed to be critical for the blind person who is attempting to master the physical environment which he cannot see. He may not be able to touch much of which concerns him and will learn of many important configurations in the environment only through verbal descriptions or other inferential experiences.

Therefore, it was decided to create the "Stanford Multi-Modality Imagery Test for the Blind" as a part of the experimental test battery which will be correlated with the Ohwaki and other measures of performance. The original concept was incorporated in the "Michigan Imagery Test" which had been introduced into work for the blind by Dr. J. R. Dunham, to evaluate travel pattern, understanding,and retention potentialities among totally blind trainees in several rehabilitation centers. For the purposes of the current study it was deemed necessary to introduce several "learning phases" which were designed to reduce the advantage some subjects might have as a result of previous experience with the manipulation of geometric figures.

The test now being used has three phases, the first of which involves the subject in the construction of simple three-sided and four-sided figures by placing a rubber band around a piece of fiberboard. The second phase involves him with the use of the same materials in the construction of four more complex designs. For the final phase, the model building materials are taken from the subject and he is given only the verbal descriptions necessary to construct a mental image. He is then asked to respond to the question, "How many three-sided and how many four-sided figures are created in this geometric pattern?" There are 12 patterns ranging from a simple retangle with one diagonal to a rectangle divided into 16 three-sided and 2 four-sided figures. Again, from the inconclusively small sample, trends appear which indicate a strong relationship between performance ability on this instrument and all other measures used. The multimodality aspect of the test implies that "visual imagery" is not the only significant modality available to the blind, and it is presumed that the data gathered from the congenitally blind will confirm this assumption.

PRELIMINARY RESULTS

With regard to interesting preliminary test findings the most striking trend observable in the data from the first 25 subjects is the sensitivity of the block design test to emotional factors. Of the 6 subjects known to have moderate to severe emotional prolems, all performed poorly. The average number of correct responses for "normal subjects" was 13.26, as compared with 1.50 for the "emotional factors group." Interestingly as can be seen in Table 2, this trend is duplicated in the results of the TRPM study. In general, the normal subjects appear to be performing about as would be expected from the Verbal IQ, as obtained on the Wechsler and the other measures of performance shown in Table 1, although these are obviously inconclusive findings.

TABLE 1

SAMPLE OF DATA COLLECTED ON THE FIRST TWENTY MALE SUBJECTS: STANFORD BATTERY OF TESTS FOR BLIND ADULTS

	Age	Empl. Status	Yrs. of Rehab. Backgrnd	Yrs. Educ.	Verbal IQ	No. Correct Sandpaper	No. Correct Ohwaki	No. Correct TRPM	No. Correct Imagery	No. Correct Questionnaire
1	16	Stud.	6.17	12.0	136	12	17	37	10	92
2	22	Stud.	13.33	13.5	136	12	15	NA***	6	108
3	22	Stud.	12.42	14.5	120	12	14	41	7	105
4	22	Unempl.	14.25	12.0	102	12	0	6	0	84
5	24	Empl.	9.92	12.0	122	12	18	NA***	10	95
6	26	Empl.	8.83	16.0	139	12	15	NA***	8	110
7	27	Empl.	13.83	13.0	107	12	2	NA***	2	91
8	30	Stud.	0.33	18.5	146	12	14	NA***	11	110
9	31	Stud.	0.33	23.0	145	12	16	48	7	110
*10	34	Empl.	0.67	12.0	118	12	8*	45	8	94
11	37	Empl.	0.33	18.0	123	12	9	24	7	108
12	40	Empl.	2.25	18.0	135	12	15	39	6	116

TABLE 1 (continued)

SAMPLE OF DATA COLLECTED ON THE FIRST TWENTY MALE SUBJECTS: STANFORD BATTERY OF TESTS FOR BLIND ADULTS

	Age	Empl. Status	Yrs. of Rehab. Backgrnd	Yrs. Educ.	Verbal IQ	No. Correct Sandpaper	No. Correct Ohwaki	No. Correct TRPM	No. Correct Imagery	No. Correct Questionnair
*13	44	Empl.	0.58	19.0	126	12	4*	33**	6	109
14	45	Empl.	0.83	8.0	110	12	0	32	8	82
*15	46	Empl.	0.17	18.0	122	12	15*	44	4	99
16	46	Empl.	0.42	23.0	123	12	2	25	3	108
17	47	Unempl.	0.33	16.0	114	6	11	36	8	107
18	49	Empl.	1.08	13.0	137	12	10	32	6	91
19	50	Empl.	0.17	17.0	146	12	15	34	10	111
20	64	Unempl.	1.83	16.0	118	6	12	21	6	103

* Denotes subjects with some remaining vision, who were blindfolded during the Ohwaki test.
** At time of testing, subject was partially sighted.
*** Subject was not tested on the TRPM.

TABLE 2

MEAN SCORES OF NORMAL GROUP (A) VS. EMOTIONAL FACTORS GROUP (B) ON SIX VARIABLES

Mean No. Right Ohwaki	Mean No. Right Imagery	Mean No. Right TRPM	Mean No. Right Questionnaire	Mean Verbal WAIS IQ	Mean No. Right Sandpaper
$\bar{X}_A = 13.26$	$\bar{X}_A = 7.21$	$\bar{X}_A = 36.36$	$\bar{X}_A = 104.40$	$\bar{X}_A = 129.52$	$\bar{X}_A = 11.36$
$\bar{X}_B = 1.50$	$\bar{X}_B = 3.17$	$\bar{X}_B = 21.40$	$\bar{X}_B = 94.00$	$\bar{X}_B = 113.33$	$\bar{X}_B = 12.00$
$N_A=19$; $N_B=6$	$N_A=19$; $N_B=6$	$N_A=11$; $N_B=5$	$N_A=18$; $N_B=6$	$N_A=19$; $N_B=6$	$N_A=19$: $N_B=6$

TABLE 3

FREQUENCY DISTRIBUTION OF OCCUPATIONS: GROUP A VS. GROUP B*

Professional	Clerical	Agric.	Skilled	Student	Unempl.	.
3 (15.8%)	2 (10.5%)	1 (5.3%)	0	7 (36.8%)	6 (31.6%)	$(N_A = 19)$
3 (50.0%)	0	0	1 (16.7%)	0	2 (33.3%)	$(N_B = 6)$

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* Mean Age - Group A = 34.05 (N = 19)
Group B = 35.33 (N = 6).

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THE STANFORD BATTERY OF TESTS FOR BLIND YOUTHS AND ADULTS

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The format for interviewing and testing a research subject on the Stanford Battery of Tests for Blind Youths and Adults is as follows. We try to begin the session in a calm manner designed to allay any apprehensions the subject may have brought to the test session. We first gather biographical data and information pertaining to the individual's rehabilitation exposure. The first actual test administered is a 6-level sandpaper sorting test designed to exclude from testing anyone with gross tactual insufficiency. This is followed by the Ohwaki-Kohs Tactile Block Design Intelligence Test. The test is introduced by a learning phase, and there is a maximum of 18 designs to copy with small blocks covered with various fabrics. One of the interesting preliminary findings is that subjects with known emotional disabilities appear to perform quite poorly on this test, and get frustrated quite early in the session.

One of the main problems in the present form of the test is that some of Ohwaki's fabrics are ambiguous in their textures, especially the material designated on the bumpy side. If you look at a block you will notice that one surface has little raised projections in it. To many blind people this resembles braille dots, and they get very wrapped up in finding the hidden code to the numbers of dots on the blocks and on the design plates. Although we inform the subject that there is no other significance to the dots than roughness of texture, many people continue to block on this part of the test. Therefore, we are trying to develop another form of the test using a plastic material. It was developed with two textures only, since we feel (and Dr. Kohs is in agreement) that only two textures are necessary to the test: rough and smooth. We hope this will resolve some of the tactual ambiguities that interfere with a subject's perception.

The next test administered is the Multi-Modality Test of Imagery. Basically, the test is divided into two learning phases and one test phase. The subject is taught some of the things that happen to the surface area of a rectangle when certain lines are drawn on it. We use a masonite notched rectangle, and rubber bands are used to make the lines. There are notches at each corner and at the center of each side. The subject is given the opportunity to manipulate the board and draw the necessary lines, eventually forming patterns that contain various 3- or 4-sided figures. All this is done in the hope of equalizing the varying background experiences that our subjects have in the area of geometry. In the final phase of the test, I describe patterns to the subject verbally; he must imagine how the rectangle looks when different patterns are drawn on it, and he can use no tactual aids for this purpose. There are a maximum of 12 patterns described which get progressively more difficult. We hope to learn whether good imagery ability contributes to successful performance on the Block Design Test.

A fourth test administered is called the Rehabilitation Sophistication Scale which contains 120 true-false items pertaining to the performance of daily activities by blind people. We have found that this test stimulates many subjects to relate their ways of solving similar problems of daily life and methods of manipulating the environment.

Finally, the verbal scale of the Wechsler Adult Intelligence Scale is administered, and that brings us to the conclusion of a quite arduous test session.

THE OHWAKI-KOHS BLOCK DESIGN INTELLIGENCE TEST

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Since I may not be known to a substantial number of the readers of these Proceedings, let me tell you something about myself. Besides being the author of the Block Design test for the measurement of intelligence, I am a diplomat in clinical psychology of the American Psychological Association, and a member of the Academy of Certified Social Workers of the National Association of Social Workers. I'm also a registered social worker for the state of California. It may be of interest to you, also, to know that I worked with Robert Irwin, back in 1913, when he was pioneering in the field of mental testing for the blind. I remember very distinctly his visit to the Vineland, New Jersey School for the Feebleminded, his conversations with Dr. Goddard, and my being assigned to work with him at one of the schools for the blind on Long Island, New York, where we attempted to translate the Binet test into tactual dimensions. From that experience I began to think about using blocks as test material. This became my doctoral thesis at Sanford University under Dr. Terman.

One of the problems that I faced was to satify myself about an acceptable definition of intelligence. What is intelligence? I don't know whether I succeeded, but at least I succeeded to my own satisfaction. As you know, no one has as yet provided a satisfactory definition of what we mean by the term. I claim that my definition is better than the others, which, I suppose is quite natural. Others claim that theirs are superior. At any rate, I define intelligence as the potential, both conscious and neurological, to analyze and synthesize; to see different objects or have different experiences, yet be able to identify common elements in each object or experience then develop some concept or synthetic understanding of what we are dealing with, either in terms of an experience or in terms of an object, is the essential process in the functioning of intelligence. I maintain that the growth of the mind is increasingly a process of continuing synthetic neurological evolution in the development of the nervous system. When it is arrested for some reason, or is interfered with, we then have areas which are operationally definient.

In attempting to develop a test of general intelligence, I decided that I would try to reduce the testing process as much as possible to one involving analysis and synthesis. I developed the idea that if I used cubes with different colors on each of the six sides, and designs which would be of increasing complexity and difficulty for analysis, I would then have a measure of intelligence.

Originally, the Block Design test was for visual presentation. The test consists of sixteen blocks colored as follows: one side is blue, another one white, yellow, red, then half red and white, and half blue and yellow. The designs vary in complexity from very simple, using only four cubes, to very complex, involving all sixteen blocks. There are seventeen different designs. The norms for each mental age were established by the customary statistical procedures which are explained in my book *Intelligence Measurement* (3).

Dr. David Wechsler found the test valuable and has incorporated Block Designs as part of the Wechsler scale. He finds this item correlates very highly with the total score of the Wechsler taken as a whole.

Now a reference to the revision made by Dr. Yoshikazu Ohwaki. He adapted and standardized it for use with the blind. His blocks and the designs are larger, have the same full faces and half faces as the original blocks, but instead of colors he uses textiles of different texture. One surface is very smooth, another is rough, and still another is very rough, and one is quite soft - comparable to the four colors. The same designs are used increasing in complexity. Appropriate instructions for applying the test and for scoring are provided in the manual which accompanies the test material.

Apart from the current work with this test at the Stanford University Medical Center, Division of Rehabilitation Medicine, the results of which will be evaluated after its conclusion, there are two studies in which the application of the test to the blind are reported: one in this country, and the other in Italy.

In an article by Sakata and Sinick the comment is made:

> "Experience with the Ohwaki-Kohs at the San Francisco Lighthouse for the Blind reveals an instrument with great promise. Additional work is needed in this country to supplement and extend that already done by Ohwaki in Japan. Modification of the blocks and of their administration appears desirable, as well as further development of the test's validity and reliability. One of Ohwaki's findings, however, is that the test scores of blind subjects on the Ohwaki-Kohs were similiar to the scores of sighted subjects on the original Kohs.
>
> "The promise of this test has two aspects: One is the evidence of its effective use with blind persons, both here and in Japan, and the other is based upon

> the merit of the Kohs test itself. Wechsler's experience with the test led him to conclude: 'The test turns out to be our best single performance item. It conforms to all stitistical criteria for a "good" test....With the possible exception of the Similiarities and the Vocabulary, the Block Design correlates more highly with total scores than any of the other tests...'" (4, pp. 55-56, 5, pp. 92-93).

Incidentally, modification of the blocks and their administration along with the further development of the test's validity and reliability are now being attempted at the Stanford Project.

In an article which appeared in *Psychologia, Kyoto* Maria Teresa Bozzo and Graziella Zecca, of the University of Genoa, published an article on first results of the use of the Ohwaki-Kohs with Italian blind, -13 to 22 years of age (1). After discussing the performance and the results, they say:

> "This can give us some idea as regards the application of the Ohwaki-Kohs test. In other words, it can be considered that the results obtained from this test efficiently integrate those of the verbal scales, rendering the evaluation of the general ability of the testees more complete, when the values are approximately those corresponding to the Wechsler-Bellevue scale verbal tests or other verbal intelligence scales. If, however, the difference is noticeable, it would be necessary to investigate personality in each case, particularly in relation to the above-mentioned traits, and to the motor and orientation ability, i.e., of those factors which could have influenced the results of the Ohwaki-Kohs test.
>
> "On the other hand, the difference between the results of the verbal tests and those of the performance tests make it always necessary in clinical psychology, to further assess the different conditions that can constitute the basis for such divergence [which is very very good advice].
>
> "In conclusion [they go on to say], one can state that the Ohwaki-Kohs test can offer information which the verbal scales cannot give by themselves, and therefore it is a useful complement for the evaluation of the intelligence of the blind."

Now for some additional personal comment: I think that if one were to consider the Block Design test alone for determining IQ, that person is pursuing folly. No one should consider any one test, whether Wechsler or any other, as being the royal road for determining an individual's IQ. I would be the first to reprimand anyone who, after giving the Block Design test, would say that "This person's IQ is 76 or 102." For the sighted any *one* type of test to measure intelligence is insufficient. Secondly, every test has its margin of error. If you get an IQ of 76, no matter by what test, it is only *probable* it is 76. It might actually be 80, it could be 85, it might even be 100; it is much less likely to be 65. We must recognize that an unanticipated high score is much more reliable than a low score, because it is less likely to be accidental. There are many factors that may interfere with a person reaching the maximum of which he is capable. Tests are supposed to be so devised that one cannot score high accidentally. That is one of the objections to multiple choice tests. These tests place a premium on guessing, so that a high score may be reached which really does not represent one's true ability. In other types of tests, where the guess element is eliminated, where you have to get to work on a project, mobilize all your capacity and intelligence to succeed, the test result will reflect a person's abilities and potentials more accurately. The possibility of error always exists, but its likelihood can be considerably reduced.

Now for the blind - although all these things are true for the sighted - for the blind we have increased complications. All the things I have said with reference to the tests, their advantages and disadvantages for the sighted, apply equally to the blind plus these additional considerations. In a sense, blindness isn't the opposite of sightedness, because there are all varieties of blindness. You have the congenital blind and the adventitious blind. There is no doubt at all in my mind, that basically there are psychological differences between the two, which may either be neurological in certain instances or reflect different kinds of conditioning - educational, social, emotional - that we still have to explore. I would like to call your attention to the work of Kurt Goldstein and Martin Scheerer who developed tests to measure abstract and concrete thinking (4). They utilize the Block Design tests, not so much to measure intelligence as to measure brain injury or brain pathology. To those of you who are not familiar with their monograph on abstract and concrete thinking may I suggest that you examine it, although their tests will have to be adapted for use with the blind.

In any event, the test does provide a measure of objective behavior when one is challenged by something to do. Apart from the purpose of measuring the intelligence of the individual, there are other important aspects of a subject's behavior: the emotional reaction, how he adjusts to the task, whether he is disturbed by it or irritated by it, how he meets the struggle to succeed, how easily he may give up - which are each most significant in evaluating a person's potentials. All these other factors which are *qualitative* have nothing to do with the *quantitative* aspects of the test, and I would say that in some instances these nonmensurable characteristics are even more important than securing the IQ, since it is amazing how little intelligence one has to have to get along in the world. Favored with a substantial amount of the other socially desirable qualities, an IQ of 80 or 90 can take an individual a long way.

In conclusion, just a couple of cautions which have nothing to do with the Block Design test, but are based upon my social work background, my psychological experience, and some years of living and watching the world change.

In planning patterns of education for the blind we should keep in mind that we are liv ing in a very rapidly changing society. What we have today in terms of educational objectives in areas of work performance may be quite different from the patterns of achievement that may be required in the future. I think the whole question of working for money is going to change, and that there may be a change in working for the sake of work itself and what it does to the individual and to society. As we plan our educational programs let us keep in mind the changes that are coming and begin now to adjust to the inevitable future realities. Personal services will require greater numbers of trained people. Other areas sure to be included are music, the arts, and other areas of creative work - not just limited to those items which have an economic value on the current commercial market. Compensation may be provided on some kind of a "guaranteed annual wage" basis, and in many instances with government supported agencies employers.

The other caution is not to shut our eyes to the recognition of spiritual values in the growth and development of individuals, and in the flowering of their personalities. I have attempted to convince my colleagues in social work that dealing primarily with the material needs of people and with those emotional problems that grow out of frustrations in that area is not enough. Quite frequently the nature of one's spiritual and emotional needs - whose satisfactions are equally essential for normal mental health - are left for the priest, minister, or rabbi to handle in such fashion as any of them may see fit. This abandonment of the client to the pastor is just as unsound as would be a similar procedure in relation to psychiatric services without the social worker *continuing as a partner* in the pastoral treatment process. It is important for us who deal with a seriously handicapped person to know how he accepts his condition, what concepts he entertains regarding his *persona* or ego: who he is, what he is, what meaning life has for him, what is its purpose, why this affliction? A person whose feet are planted on a base that includes faith and hope, and the acceptance of the idea that even if we cannot satisfactorily explain the whys and the wherefores, that the ruling forces of the universe are such that the "good" inheres in all the happens, is fortunate indeed. He is thus provided with a unique strength for which there is no substitute. But this is an act of faith, equal to any opposite belief, or which rules out any belief at all. Even the phenomena of chance are governed by law. Whose?

If we can use the word "faith" in a very broad sense, not tied necessarily to ritual, not tied to any specific religion unless essential, but "faith" - a belief in certain eternal values in terms of self, and in terms of other human beings, we would be making a real contribution on the education of the blind regardless of the character of their deficiency.

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A POSSIBILITY FOR TACTILE ACCESS TO THE PRINTED PAGE

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The research described here is primarily "fallout" from more basic research programs that have been sponsored for the past three years by the Department of Defense and National Aeronautrics and Space Administration (NASA). These more basic programs have been fairly large and have involved a number of people, including my colleagues at Stanford Research Institute, Hewitt D. Crane and Kenneth W. Gardiner, and the head of the Electrical Engineering Department at Stanford University, John G. Linvill. The objectives of the basic program in tactile perception are to develop models to describe tactile information processing, and to develop instrumentation and display systems for tactile communication.

The research that I want to discuss here pertains to one particular aspect of the total program, that is, an application giving blind people greater access to the printed page. We can consider two categories of reading machines for the blind - direct translation reading devices and recognition devices. The direct translation device merely converts light and dark to something that can be sensed by a blind person. The recognition type of device senses the optical image, recognizes what the information in the optical image is, and then translates this recognized image into a standardized, easily comprehended format. Examples of dir-translation devices are the Optophone and the Visagraph, and examples of the recognition-type devices are those being worked on at Mauch Laboratories, Haskins Laboratories, and others. The work that I will be describing is in the direct-translation category and is directed toward a device simple enough to be personally owned. In this kind of device, it is up to the person to perform the recognition; the device merely translates optical media into something that can be senses without using vision.

Our basic idea is really very old. To explain the idea, consider three plane surfaces: the first is the printed page, the next an array of photocells on which an image of the printed page is formed. The pattern on the printed page is transformed into electrical signals that represent whether there was black or white in a particular region of the page. The third plane is an array of tactile stimulators. Each tactile stimulator in the array is connected through some electronics to a corresponding photocell. Then, if in the grid of photocells a particular photocell is black, the corresponding tactile stimulator is activated. In this way, a tactile image is formed, which is a facsimile of whatever is imaged on the photocell array.

We have attempted to reexamine this old idea in the light of modern technology. As a result, we feel modern electronics offers a few novel contributions to the implementation of this type of system. One development is a new kind of tactile stimulator based on the piezoelectric effect. Piezoelectric materials change in a mechanical dimension when an electrical field is applied. This stimulator is simply a reed, contructed analogously to a bimetallic strip, only it is not bimetallic. The reed consists of two layers of lead zirconate sandwiched together between electrodes. When a voltage is put across these electrodes, the reed tends to warp in one direction; if the voltage is reversed, it warps in the other direction. If these reeds are cantilevered, they can be made to vibrate with sufficient amplitude to give an adequate tactile sensation. The advantages of these reeds are that they are very small and very efficient. For example, an adequate tactile sensation can be obtained with something less than 50 microwatts of power, and it is very easy to arrange these reeds in closely spaced arrays of 100 or more.

Thus, the first novel thing that modern technology has to offer to this old idea is a bimorph tactile stimulator. This stimulator brings us to the second point, and that is the idea of dynamic embossing. By this I mean an array of tactile stimulators that are activated as the array is moved over the printed page, in contrast to the Visagraph which produces an embossed page in which the print is raised and it is up to the reader to feel it. The movement of the patterns over a static finger, I feel from our results, may explain some of the success that we have had.

The third thing that modern engineering has to offer to this old idea, I believe, is integrated circuit technology. Integrated circuit technology, which now is producing readily available components, offers the possibility of an implementation that would truly be very convenient, small, and easy to use. Of course, we are a long step from applying this technology to a reading aid.

Finally, another contribution of modern technology toward this problem is the digital computer. Use of a small digital computer in real time has allowed us to test certain things before we actually develop them. Thus, we have taken the old idea of making a tactile image corresponding to the printed page, but instead of actually developing a system that would do that, we have simulated it on a computer. We have built a real output which permits people to feel the vibrating reeds. But we realized that while it is with in the state of the art to develop an integrated circuit device with an optical input, this would be a fairly expensive development. We have not taken that step. Instead, we simulated the optical input on the digital computer to first answer the question, "If we developed such a device, could anyone read with it?" In order to answer that question, we used a system that had been developed for more basic tactile research. To give you a good idea of what this system does, I would like to show a movie at this time and then talk about some experiments that we have done with the equipment.

Synopsis of the Film

In the opening parts of the film Dr. Linvill of Stanford University explains the basic idea of using arrays of photocells and piezoelectric bimorph stimulators to produce a tactile facsimile of the printed page. Dr. Linvill states that this implementation is within the state of the art. Thus, the major question is whether such a display is useful to a blind person.

In order to test readability, a computer system for simulating movement of a hand-held probe across a line of type is illustrated. In this computer simulation, letters are moved across a 12 by 8 bimorph array in much the same way as certain "moving signboard" news display boards. Candy Linvill then reads a news item concerning the Republican Convention in San Francisco from the bimorph display at a rate of 23 words per minute.

That film was made last summer. Since that time we have continued with this work to the extent that there have been over 200 hour-long sessions with this equipment. Some of these sessions have been exploratory and in some we have determined reading rates for various conditions. Three subjects to date have been used.

The first subject was Candy, who was shown in the movie. She is 13 years old and in the eighth grade. We gave her a braille Grade 2 reading test and she reads about 125 per minute. She has been blind since birth.

Our second subject was a 16-year-old high school senior boy who has been blind since the age of 10 and can read braille at something like 100 words per minute.

Our third subject was an 18-year-old sophomore at Stanford, a girl who has been blind since birth and reads braille about 140 words per minute.

In our experiments, the array of tactile stimulators used consisted of 96 piezoelectric reeds, each with a point probe protruding through a hole in a perforated sensing plate. The reeds are mounted at a 45-degree angle and vibrate so that the point probe moves both tangential to the skin and normal to the skin. When activated, these reeds are vibrating at 250 cycles per second. The best and strongest sensation is felt when the mode of operation is such that the poke probe is not in contact with the skin during the full cycle. If you press down hard on the reeds, they tend to damp out and the sensation is not as strong.

Typically a subject reads with one finger, although I have encouraged some of them to try two or three fingers. Since this is an early stage of the research, our approach has been to let the subject adjust the sensing plate to his liking and to place his finger in the manner he likes. It has been up to them to develop the best way to get the information from the display. After practice, the subjects allow the letters to move under their stationary finger. At reading rates above 20 words a minute, it is completely futile to try to move your finger to scan a letter, because the rate is too fast.

Besides the block letters shown in Figure 1, we have recently been experimenting with standard typewriter font, shown in Figures 2 and 3. We have also, in a very exploratory fashion, put braille Grade 1 in the same device.

First, I would like to report on some reading rate determinations which were made under a fairly carefully controlled procedure in which we had specific periods of practice, rest, and test. In each one-hour session, we would have four two-minute tests. We would have a test, then there would be a period of practice, a period of rest, and then another test, and so forth. The same schedule was carried on in each session. The results from these tests are shown in Figure 4.

One of the difficulties in our computer simulation is that so far we have only been able to present the material at a fixed rate. This is an unnatural way to read because it is more natural to slow down over the parts that are difficult and speed up over the parts that are easy. All of our data have been taken under constant rate conditions.

To score the performance we simply counted correct responses. The material used was whatever the subject was interested in. Some examples of subject material that we have used are *Time* magazine, the Beatle books, and some science fiction novels.

Of course, all of our training times are very short compared with how long it takes to learn any new task of this sort. We do not have any real indication where these curves could eventually go. If someone had a device and could use it day in and day out, I would be a little hesitant to stipulate from these data what could be the ultimate.

Another kind of experiment which I would like to report on is aimed at trying to get some indication of how many stimulators are needed. The original array of stimulators had 96 stimulators in an 8 by 12 matrix, and we thought that subjects would probably use two or three fingers. It turned out that they have used one. One finger only spans about a third of this matrix so that two-thirds is not being used. To get a better indication of the number of stimulators needed, we performed an experiment in which we did not turn on the full array; we only turned on parts of it. The block

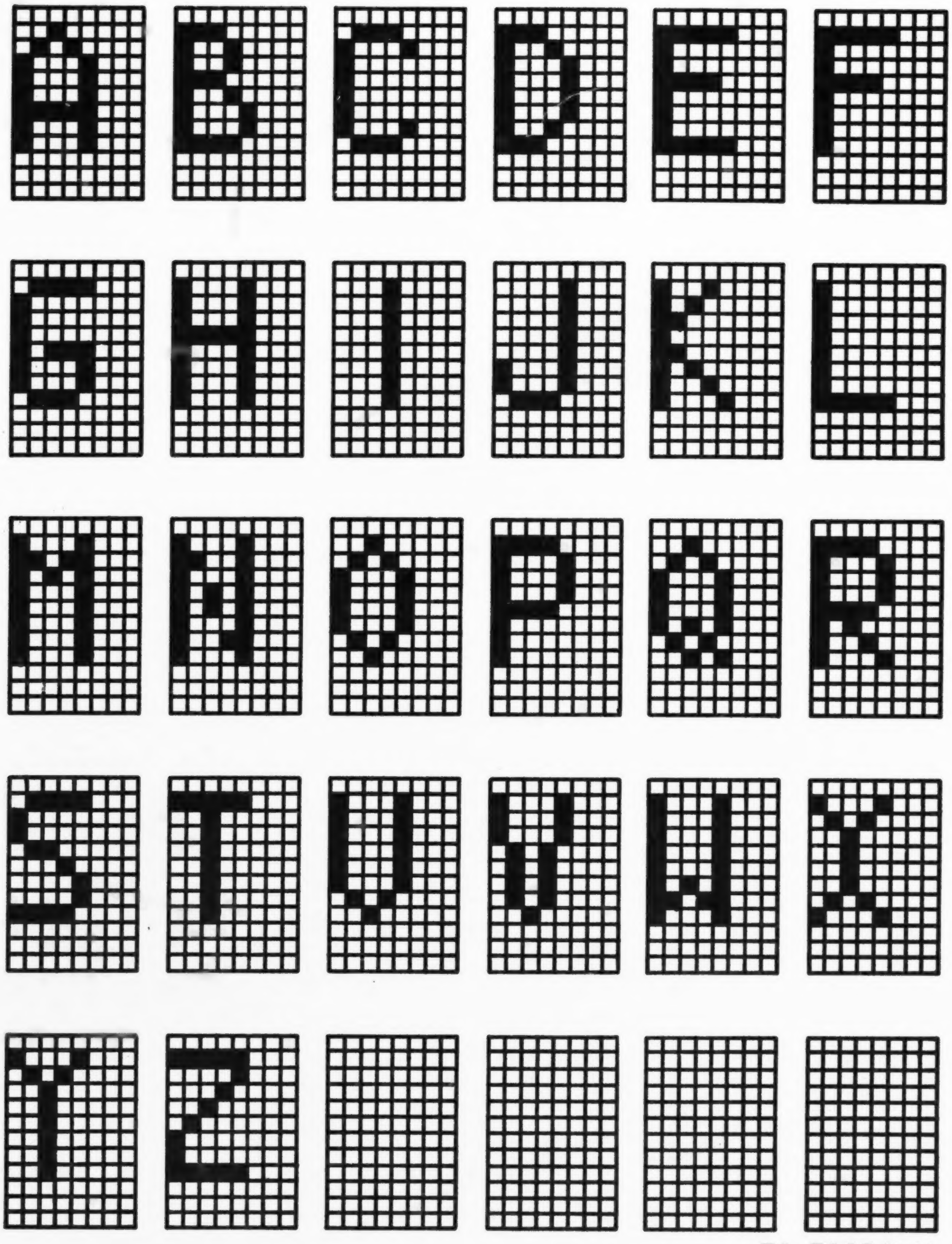
TA-746541-11

Figure 1. Block Letter Alphabet

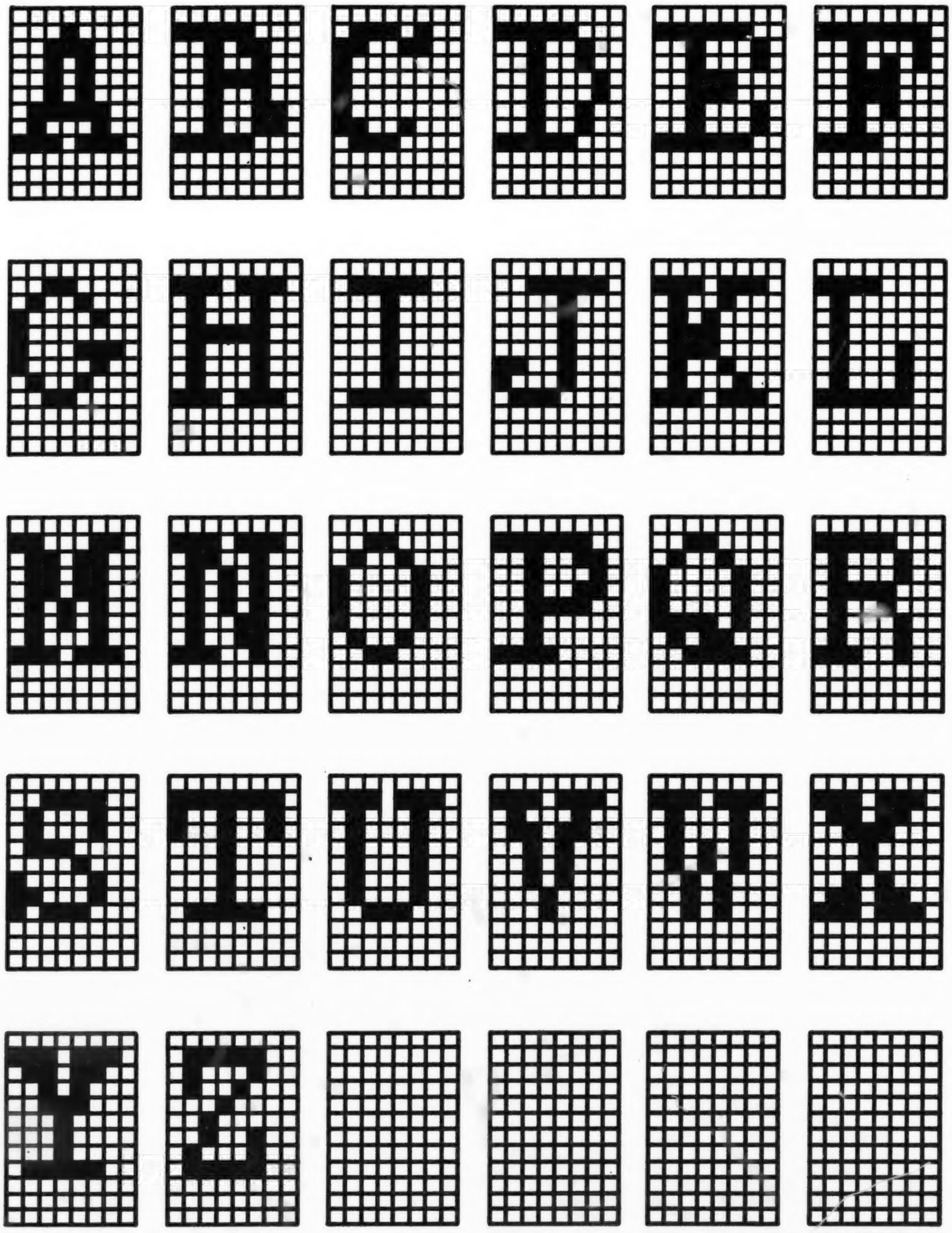

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Figure 2. Quantized Pica Typewriter Upper Case Letters.

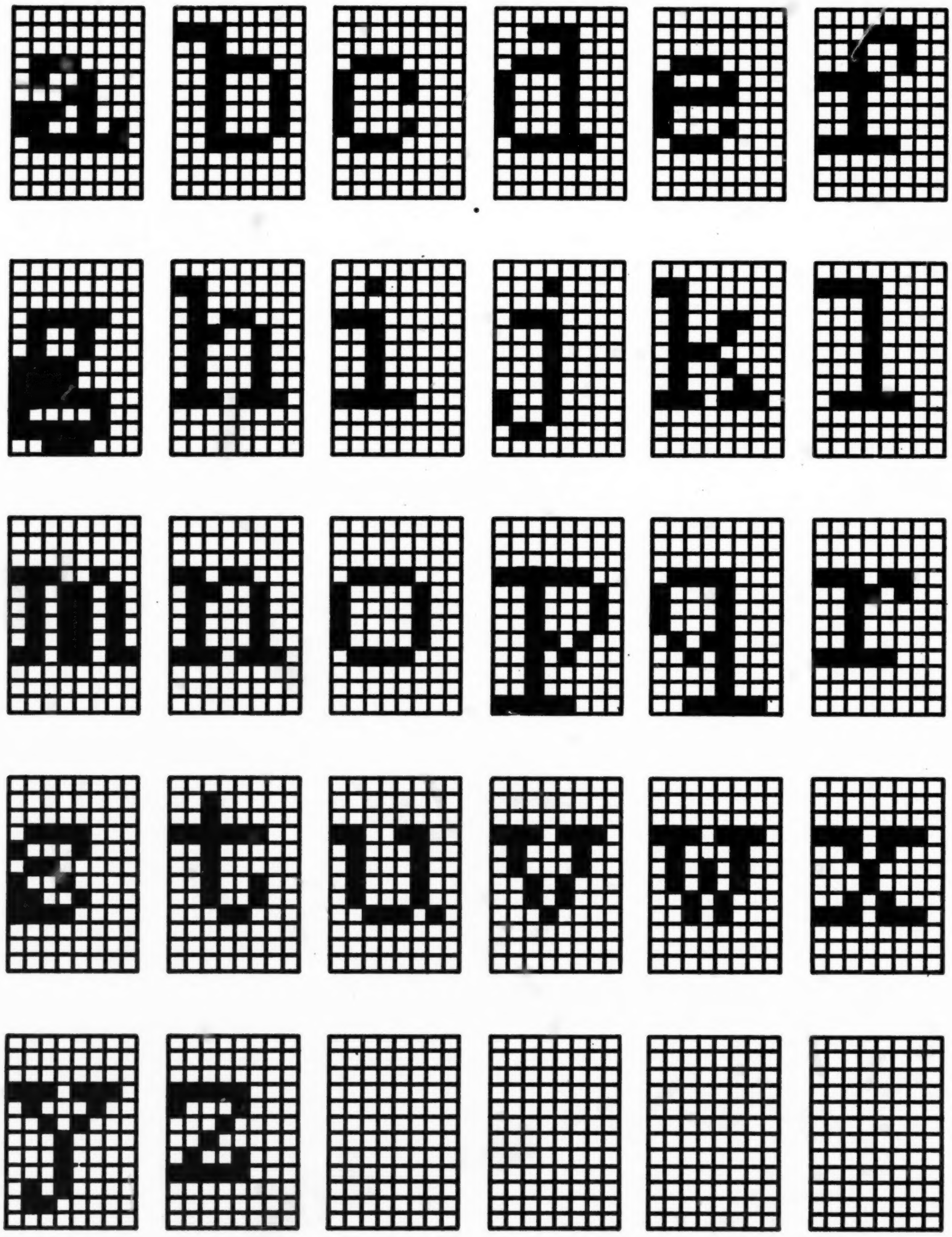

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Figure 3. Quantized Pica Typewriter Lower Case Letters.

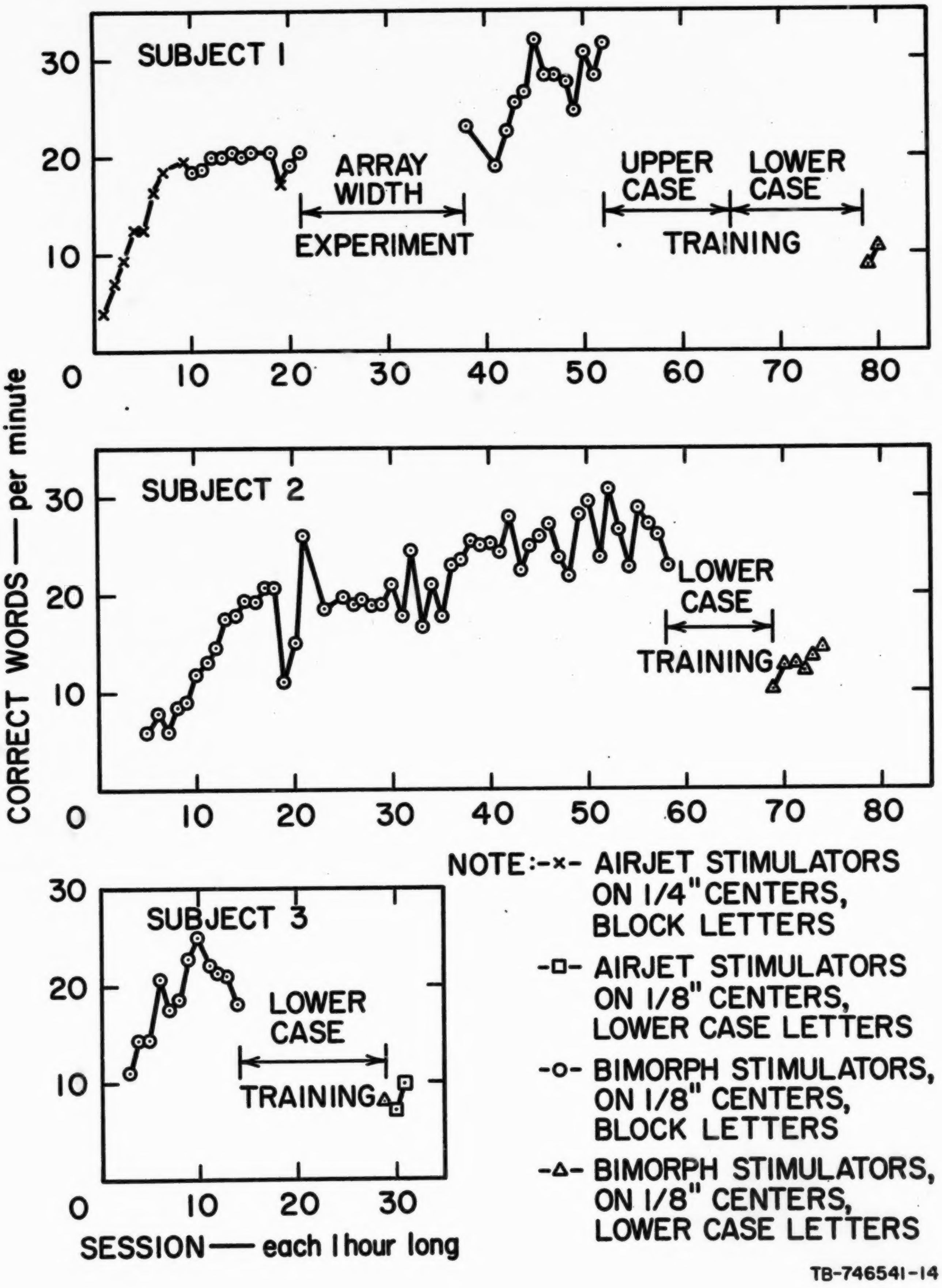

Figure 4. Textual Reading Performance Curves.

letters of Figure 1 are five columns wide and eight columns high. In this experiment we only turned on a fixed number of columns. For example, in one session, we turned on four columns, in another we turned on three columns, etc. We measured reading performance at each of these settings. In order to get some kind of valid indication, we practiced the subject for a considerable period with each number of columns and then did a test. This took several months. We started with four columns, went to three, two, and one, and started back up again to make sure that there was not some overall learning curve. All of these sessions were fairly carefully controlled as far as being the same kind of test and the same kind of material in each case were concerned. Figure 5 shows the results of this effect of the array width. The greatest change was when we went from a display consisting of only one column to a display of two columns. One column means that the reader is seeing only a very small part of the letter at one time. In fact, a one-column display is a tactile analog to the Optophone. With the one-column display, the average score on a test was 22 percent correct. All of these tests were performed at a 24-word-per-minute presentation rate. In other words, in every case we gave this material to the

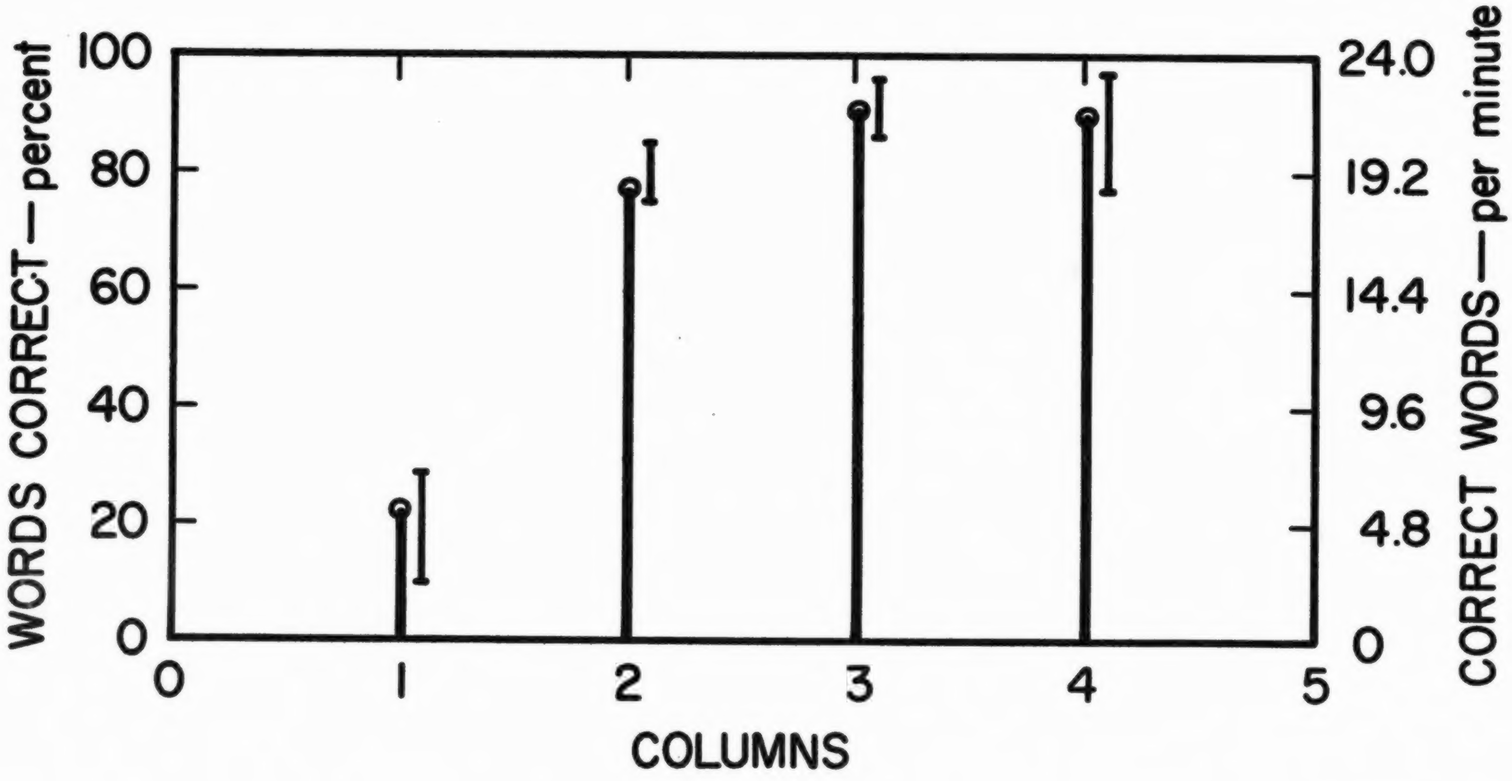

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Figure 5. Reading Accuracy Versus Window Width in Columns.

subject at 24 words a minute and then scored the percentage of the words that were correctly identified. At one column only 22 percent of the words were correctly identified. In going to two columns, it jumped to 77 percent, for three columns it was 91 percent, and for four columns it was 90 percent. We did not go to any more than four columns because four columns is the width of a finger. An observation from watching this experiment is that visually it is practically impossible to read the light display with only one column. In fact, we could not visually score 22 percent with the light display. This was interesting to us, because it gives some indication that perhaps the tactile sense can integrate temporally better than the visual sense. Two columns are very difficult visually, but the primary difference between one and two columns visually is the ability to recognize corners. It seems that this recognition of corners aids very significantly in the recognition of alphabetic shapes. There is probably very little difference between three and four columns. So it seems from this that actually a smaller number of stimulators may be needed than we initially thought.

Thus the results of our reading tests indicate that in less than 17 hours of practice, all three subjects were reading at greater than 20 words a minute. Two subjects, who have had 50 hours of practice, are doing better than 30 words per minute. If we compare this to material in the literature, Geldard had an artificial code consisting of five stimulators on the chest, in which he varied the frequency of vibration, duration of vibration, and spatial location. After 65 hours of practice with this artificial code, a subject was able to read at something like 34 words a minute. I feel that we have shown that almost the same rate can be obtained in about the same amount of time with alphabetic shapes. Of course, the significance of alphabetic shapes in obtaining access to any printed document is apparent. We felt at this point that capital letters could be recognized and read fairly easily. Books could be printed in capital letters, but we wondered if the actual print that exists in books and typewriter font could be used also. So in the last few weeks we have been experimenting with the quantized version of typewriter pica type, including both upper and lower case. We now have all three subjects reading this print. They have not obtained the rate they achieved with the block letters yet, but they have not been trained on it for a very long period either. It is obvious that the typewriter print is more difficult than the block-letter print when you think of the effect serifs have on the letters. For example certain letters like an *E* and a *B* in block-letter form are very different. When you add serifs to the *E*, it becomes very difficult to distinguish it actually from *B*. We first thought the capital letters of typewriter font would be much easier to recognize than the lower case because the lower case letters are smaller and they also have serifs. But it has actually turned out, much to our surprise, that the subjects have learned lower case with every bit as much ease as they learned the upper case. We were starting, in the case of the lower case, from a much different point in that our subjects have never seen lower case and they did not know some of the shapes. For example, the shape of an *a* was a completely new thing to learn, whereas initially they knew the shapes of the block letters.

Of course, there are a lot of things that we have not been able to do yet. They could add significantly to our results. One is, "How do you give someone control, either a manual probe that can be moved across the printed page or something much more sophisticated, to maximize information acquisition ability?" I feel that the right kind of control should be able to help greatly in this kind of information acquisition task. However, the simple idea of a manual probe may be psychologically difficult, and I think some of the results with the Optophone have shown that it is difficult for a person to manually track a line of type with a probe. I think this is an area in which some good research could be done.

In conclusion, I would like to describe, again, what we feel the future posibility in this research could be. That is, combining these very simple and very efficient tactile stimulators with an integrated circuit, I feel that it would be possible to have a small, possibly hand-held device, perhaps not too much larger than a blackboard eraser, that a person could move across the printed page and reproduce dynamically tactile images of whatever was on the printed page. I think that these kinds of experiments indicate that these tactile images could be received and recognized by the subjects. Reading rates may be low compared to braille, but I feel the ability to have access to any printed document might warrant this kind of approach. Of course, before we can achieve eventual implentation of this device, there are a number of technical problems that have to be overcome, and some of these are both engineering problems and psychological problems. We need to develop an integrated circuit coupled with photocells of the right type and find simple ways of coupling this with tactile stimulators. We feel that all of this is feasible; it is just a matter of doing it.

We also need to explore some of the psychological factors, such as what the required resolution really is. We have also found very recently a phenomenon that we really do not understand yet, and we are not even sure whether it is psychological or engineering. When we get up to word rates above 35 words a minute, the subjects complain that the letters tend to fade out or tend to blur. We are not sure whether this is a peculiarity of our equipment or a real psychological problem. We have some ideas of what to look into in both cases. Even if it is a psychological problem, I am not convinced that it cannot be overcome.

Finally, I would like to say that I think that these technical problems, while very challenging, can be overcome, which leaves us with really the major problem: funding this kind of research.

COMMENTS

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Many of you are waiting for the completion of the standardization of the Perkins-Binet Tests of Intelligence. We anticipate completion of the collection of protocols in May of this year. We plan to complete the statistical analysis, conducted by Educational Research Corporation, by the close of 1965. The preparation of the report will extend into 1966 and, hopefully, the manual for administration and the test materials will become available in the latter part of that year.

The format of the Perkins-Binet has not been definitely established. Preliminary inspection of the data seems to suggest that there will be one set of materials with two sets of norms and two record forms: one for use with visually handicapped subjects with no usable vision, and one for use with visually handicapped subjects who have usable vision. The need for the division of the subjects has been made evident recently by failure to do so in the standardization of the Haptic Intelligence Scale with resultant limitations in the application of the normative data. Everyone engaged in the development of nonverbal techniques should make provision for the difference in approach to the task of visually handicapped subjects who have usable vision as compared to those who have no useful sight.

I greatly enjoyed Dr. Kohs paper, and I feel that the best tribute that could be paid to him would be a catalog of all the variations and inclusions that have been made of the Block Design test. An interesting variation that I want to mention is that being used by J. Juurmaa at the Institute for Occupational Health, Helsinki, Finland. Juurmaa is utilizing the block design principle in a two-dimensional format. The designs are produced on metal surfaces via different types of scoring. They are reproduced by assembling triangular segments in a recessed form board. It would seem that there may well be a tactile spatial factor present in the Ohwaki-Kohs test that is not present in Juurmaa's variation.

I would like to mention two research plans the development of which is in progress at this time. We are very interested in the type of child referred to by Katie Sibert. We are very concerned about the partially seeing or residual vision learners. It is our desire to investigate teaching materials, methods, and perceptual diagnostic techniques for this group. We want to be able to determine which child should use print and which child should use braille. We want to determine whether different teaching methods are best suited for children with different types of visual perceptual function. For example, perhaps one type of youngster may develop more rapidly through procedures like those developed by Barraga, whereas another child may react more rapidly to the Frostig program.

Our other project, for which we have been waiting for personnel, is a study to evaluate the feasibility of programmed instructional materials in verbal subject areas. It is our intention to use a braille presentation and braille response in a ring-bound textbook format. In the first stages we want to avoid the use of hardward. The initial subject area will be English grammar based upon a standard programmed textbook.

I will confine myself to several comments. Several speakers have mentioned that we should be concerned about the residual vision group. There is one important concern that has not been expressed. I am involved in counseling as well as in research. In the counselor's role I have become very aware that these young people have much greater adjustmental problems than those youngsters who are more functionally blind, or the true partially seeing youngster. Their central problem is in establishing an adequate concept of one's self. I can illustrate this best by two quotes heard very frequently: "In one situation I am a seeing person and in another I am a blind person"; or "My trouble is that I am neither fish nor fowl." Any educational program should provide ample opportunity for the development of realistic self-concept in these people.

My final comment is in reference to Bill Dauterman's project with the Ohwaki-Kohs Block Design Test. I am very pleased that they are seriously concerned with the mental imagery of these persons. I am concerned that in this country we have not had enough interest in the differences in the mental imagery of those born totally blind compared with those who saw to some extent at some time. From Europe, particularly Germany, we have learned something about the organization of tactile perception. However, none of that work is recent, and it should be updated and extended with the inclusion of more definitive investigation into the nature of the mental imagery of the born blind. What information in these areas that is available is being inadequately used. Dr. Robert Scott stated it very well when he said that in spite of the truly limited amount of work that has been done to date, there is still very little of that being applied in the educational program.

COMMENTS

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The literature has shown that you can make more use of residual vision than used to be thought. When I taught a general course in exceptional children, I used to preach how you have to conserve vision. That is not so much a worry any more. In reading the excellent article of Sam Ashcroft, and the reports of Jones and of Bateman, there is a feeling of "let there be light," or as Ashcroft has said, "the repeal of prohibition." It would seem to me to reduce the total number of people who would have to depend upon relatively inefficient braille type methods and increase the utilization of residual vision.

This gave a sort of *deja vu*, as it were; as an outsider I observed this similar kind of phenomenon occur in the education of the deaf. The transistor enabled great improvements to be made in the hearing aid. You could see the positions being taken in the battle as to how much you should use hearing aids to exploit the hearing that was available.

As you may know, in the field of the deaf, more so than in the field of the blind, practically nobody is completely lacking in sensory acuity. Almost no person is ever found to have no sensitivity to sound. The question is, therefore, how much is there to be taken advantage of, given sufficient amplification with the hearing aid; and the related question of perhaps using two aids, either through a Y-cord from one amplifier or binaurally. The whole battle was fought in the 1950's, and now (I'm not an expert here) it is taken for granted that you should use whatever hearing there is, and don't worry that you might wear it out. The otologists themselves were never concerned with that.

It was mentioned that there are problems of translation from research into practice. Some of these don't need to bother us as much as they do. We merely need to go ahead and do what is to be done - for example to use methods of using vision where possible. Let me give you another example. My wife works part time as a school psychologist. She runs into a school nurse who does the vision testing for children. She insists on using the Snellen Chart, and since everything goes to her, she absolutely blocks any referral of any child who appears to read adequately on the Snellen test, and apparently is immune to any suggestion that near vision might near vision might be under a strain, especially in these young elementary children who have problems of farsightedness. There is something that needs to be done. Now how do you do it? What is the practical problem? You don't have to worry about the translating into action, all you have to do is take whip in hand, perhaps, and get the judgments made.

There were two points that I thought ought to be developed further by the psychologists. One of these derives from the report on the proportion of the blind children in the State of California who are in mental institutions. This is mostly in institutions for the mentally retarded - Fairview, Pacific State, Sonoma, etc. These data are kind of schocking. I have known, since I am a research consultant at Pacific State, that a lot of blind children are there. What took my hat off was that a full one-fourth, I calculated it to be 26 percent, of the identified blind children under 18 in the State of California are either in mental institutions or on the waiting list. If you add the 781 to the 32 on the preadmission or waiting list you get 813, which is 26 percent of the 3129 identified children. I think this gives us pause for concern. I thought that some of these children might have been placed there who did not need to be, but if we are placing one in four blind children in a mental institution, we are certainly misdiagnosing. We are certainly not giving a considered evaluation of the early history of these children, or what is happening to them. I think the literature on the sensory input deprival ought to be considered here in terms of what may possibly be going on.

I want to make one further psychological point and that is with regard to testing developments. I salute Dr. Kohs, whose work I have respected over the years. I want to make a suggestion that some of the future development of ability testing of handicapped children be thought of in terms of components of ability and not worry too much about a general intelligence which often takes a mystical form; as Dr. Kohs pointed out, intelligence is awfully difficult to define to the satisfaction of more than one person. It is better to think about there being various abilities in a person; that is to say, don't presume that there is some one IQ to be found as though it were the blood type of the person or his eye color. Rather, think of him as having this one ability to a certain extent, having some other ability to a certain extent, having still another ability to a certain extent. Some of these are so-called nonverbal abilities, some of them are so-called performance abilities, some are spatial, some are memory. They may or may not intercorrelate somewhat, but the point is to find the spectrum of those that he has. We have found this of considerable help in the study of the mentally retarded and inferentially in the study of deaf and cerebral palsied, etc., and I don't know but what it might be of some assistance in the study of the blind. Think, if you will, of factors of ability.

One of our students, Miss Cull, completed a dissertation about a year and a half ago in the study of tactile measures of ability in blind adolescent and adult subjects. She worried herself about the materials that would do for the purpose and finally settled upon pieces of vinyl floor tile carved into squares and triangles and circles and half-circles, mounted on hardboard so that she had something which could be felt with the fingers, which would not wear or round off by use, whose total size could be judged, and whose contours could be judged. Then she used, for example, a model on the left with choices over on the right to be matched. Or one on the left to be judged as composed of two of these five or six which are over on the right. As validating criteria she used spatial relations tests for sighted subjects working with sight. She also had them work blindfolded. And she used two different vocabulary tests. Now a very surprising thing happened. These instruments measured factors, if you will, or abilities in their own right essentially uncorrelated with the vocabulary tests. In the sighted subjects, these were uncorrelated with the spatial relations tests. On a factor analysis clear abilities which could be identified as among those found in young adult subjects did clearly emerge. One was what might commonly be called perceptual speed, the ability to make quick and accurate perceptions as in identifications and discriminations. The other was a kind of figural reasoning ability which was found where, for example, you had to discover which two components would make up this one, or where this one was when it was rotated and inverted, etc. The work suggested that in the adult sighted or blind person you had a considerable differentation of ability such that you *could not say* that these haptic type of abilities were the same as the sighted spatial relations, or the same as that given by complex vocabulary tests.

Of interest also is the fact that these abilities were more clearly differentiated in the blind subjects. Although Miss Cull found every testable subject she could locate from 16 on up, in the Los Angeles area, her numbers were too small to give highly dependable conclusions. But I thought the methodology was of some interest.

SECTION III

Orientation and Mobility Research

Chairman: *Leslie L. Clark*
American Foundation for the Blind
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INTRODUCTION

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In this section we shall consider three projects in the area of mobility research: the first on psychoacoustic abilities, the second on the results of a demonstration project to provide mobility instruction in the schools, and the third the plan for mobility instruction and special education plans for a large urban area.

The inclusion of reports on basic research and on implementation in practice was deliberate. Let me explain why. When I joined the American Foundation for the Blind, in 1960, it was to assist in a project entitled "An International Survey of Technical Devices for the Blind and Severely Visually Impaired." The survey had two aims: to gather information about everyday devices used by blind persons, and to plan for an international conference on the research and development effort needed to develop future devices. Among the devices we considered were, of course, reading machines and guiding instruments. It very quickly became obvious to us that a mere catalog of devices would not do. To paraphrase Newton Minow, we found a "vast wasteland" of device developments - devices which had been brilliantly engineered and were spectacularly unsuccessful in aiding blind users. The blame could not be laid on the shoulders of the engineers, for they lavished their best talents on the design of these devices; indeed, in some cases the thinking was so sophisticated that the technology of their execution is just now becoming available. The failure of these machines lay, it seemed to us, in two important areas.

The first was, and still is, a woeful, indeed a frightening, lack of knowledge of the basic sensory processes. The second was an almost complete lack of communication between the designers of these devices and those responsible for putting them into use. In the latter category I include not only blind users, but also those responsible for programs of aid and rehabilitation of blind persons. Our efforts since 1961, then, have been aimed at reducing the potency of these two factors. I speak here mostly of the Department of Research and the International Research Information Service, but the editorial *we* must include many others in the research community as well.

We have tried to alleviate the first deficiency in the operation of the IRIS: in holding conferences, in publishing research materials, and in offering consultation to designers of instruments. We have tried to alleviate the second deficiency by promoting, as best we can, that essential dialogue between researcher and practitioner. The 1962 International Congress on Technology and Blindness presents a useful state of the art snapshot of technological developments and applications up to the early 1960's; the *Research Bulletin* carries the responsibility of publishing additional research data as it becomes available. In the 1964 Rotterdam Mobility Research Conference, we made a more conscious effort to promote the essential dialogue already mentioned. It is, of course, the predilection of conference organizers to be pleased with their own efforts, but I think it not unlikely that we were right in thinking that there were some real efforts to cross the language barriers between researcher and practitioner in that meeting. I believe the reader of these *Proceedings* will note elsewhere similar calls for discussion of research, the applications of research in practice, and the necessary increment in validity of research which is informed by the experience of practitioners.

We are greatly encouraged by these developments, and look forward to the leap in creative amplification which must follow them.

SOME BASIC RESEARCH ON THE SONAR SYSTEM OF THE BLIND*

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INTRODUCTION

The "obstacle sense" of the blind is ancient in reputation. Until the work of Supa, Cotzin, and Dallenback (7), it was often referred to as "facial vision." The results of that study and other research clearly demonstrated that the "obstacle sense" is a specific form of auditory perception. The stimuli involved are sounds in the form of echoes which bounce off obstacles to the ear and thereby are "sensed" or perceived. The ability to use this echo information is, of course, not limited to the blind (8), although a major portion of the work has been done with blind persons because of their having an assumed sophistication with the task.

Many studies have arisen since 1944 dealing with various aspects of this sonar-like technique. Not until comparatively recent years, however, has attention been directed toward quantifying human sonar capabilities. Kohler (2) made some measurements of object distance perception by blind and sighted subjects in connection with the development of a sonar type of mobility aid. Myers and Jones (3) presented 6-foot long objects of various widths to blind school children and recorded the number of correct detections by each subject. More recently, Kellogg (1) became interested in the human aspects of the problem through his familiarity with the exceptional sonar abilities of animals such as the bat and porpoise. It is his work which serves as a foundation for the results reported here. Kellogg found, e.g., that subjects could discriminate rather small changes in perceived size of standard circular discs and he drew psychophysical curves describing the limits of his subjects' ability at that task.

The present program of research is oriented to the problem of measuring human sonar abilities under standardized conditions. It must be recognized that these measures are made under controlled laboratory conditions and the results cannot be generalized to the natural environment in which we live.

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* This research is sponsored in full by a grant from the National Institute of Neurological Diseases and Blindness. Particular acknowledgement is made to the contributions to this research of Mr. S. H. Feinstein, Dr. Winthrop N. Kellogg, and Dr. Ronald J. Shusterman. Portions of this material have been submitted to the journal Science and to the publications of the American Psychological Association for consideration as articles.

To date, our studies have focused exclusively on unaided echo detection abilities. By unaided we mean that the sonar signal and the echo are not initiated or assisted by mechanical or electronic devices. This is important to remember since performance may be effected by the origin of the sonar signal, the surroundings in which it occurs, etc. The environmental factors have been held as constant as feasible so that the subject could approximate his optimal level of performance.

The overall purpose of this program of research is to provide some quantitative measurements of the limits of human sonar abilities. In doing this we have, to date, dealt only with those abilities as they occur in blind subjects. The questions asked so far have been:

1) How small a target can be reliably detected?

2) How are size and distance related in this minimal size measurement?

3) How small a difference in size must exist between two targets before one is no longer reliably reported to be smaller or larger than the other?

4) What effect does the shape, location, area, and orientation of a target have on its detectability?

Data will be presented for each of these questions.

METHOD

Four subjects were used in each of the experiments to be reported. A fifth served only in the first study dealing with the response threshold for minimum size and distance factors.

All subjects were blind males between 20 and 30 years old. Each had been blind for at least 5 years and none had any spatial vision. Their hearing had been tested and found essentially normal, although one was found to have a mild sensory-neural hearing loss. The effect of this slight loss on the subject's performance has not appeared to be significant. The subjects are well above average in intelligence and are able and willing travelers.

Testing was done in a special room constructed for echo detection tasks. It was relatively isolated from noises outside the laboratory and the walls, ceiling, and floor were covered with sound absorbing materials. Though not anechoic, the room provided a relatively constant auditory environment in which to perform the tests. The average sound level in the room was 43 dB on a sound level meter c scale with reference pressure of .0002 dyn/cm^2. The apparatus used to present the circular sheet metal targets to the subject extended down from a cupola above the room. Targets were raised and lowered on a metal rod by an experimenter in the room above. Subjects were seated in a testing chair which could be adjusted for the height and distance from target demanded by the experiment. A white noise source was provided between trials in order to mask possible undersirable sound cues. The apparatus and a subject in position are shown in Figure 1.

The first experiment dealt with how small a target could reliably be detected by each subject. At the same time, the effect of subject-to-target distance was assessed. Since this was the first experiment in which the subjects served, some preliminary familiarization and adaptation took place. Actually, pretraining began during the initial visit to the laboratory. After examining the laboratory, the subject was seated in the testing chair and standardized instructions were read. The subject was told to begin his chosen "noise" after the "ready" signal and then make his judgment as to presence or absence of the target on future trails.

The subject's chair was then adjusted so there was a distance of 18 in from his ears to the target. A target, 19.4 in in diameter, was positioned in front of him. He was then required to utter some sound on the signal "ready" and make a judgment of "yes" or "no" as to presence or absence of a target. A series of practice trials were run using an equal number of target and no-target trails in a counterbalanced order. The subject was given information concerning the accuracy of his judgments. When he could successfully discriminate between target and no-target, a new smaller target was introduced. This procedure was continued until the smallest target detectable with the 90 to 100 percent accuracy was found. This target was then used as the *largest* in a series of 5 subsequent stimuli. Each of 4 smaller targets were 60 percent by area of the next larger. A randomized series of 100 presentations of each of the 5 discs in this series and 100 no-target trials was then judged by the subject without feedback and constituted the echo acuity data at that distance.

A similar, but abbreviated, procedure was followed in locating a range of 5 targets suitable for measuring echo detection ability at 24, 30, 36, 42, and 48 in. In addition to these five distances, it seemed appropriate to make some measurements of the maximum distance at which targets could be perceived. Accordingly, three measurements were made beyond 48 in, extending the distance to the maximum allowable by the apparatus.

The data obtained from the measurements at 24 in through 48 in suggested that the auditory angle subtended by a target was related to the probability of a "yes" response at any distance from the subject. Using this hypothesis, targets predicted to have high, medium, and low probabilities of detection were made for each of the longer distances; 67 in, 87 in, and 108 in.

Each of the subjects were given 5 to 10 minutes of warm-up time before an experimental session in all phases of the exper-

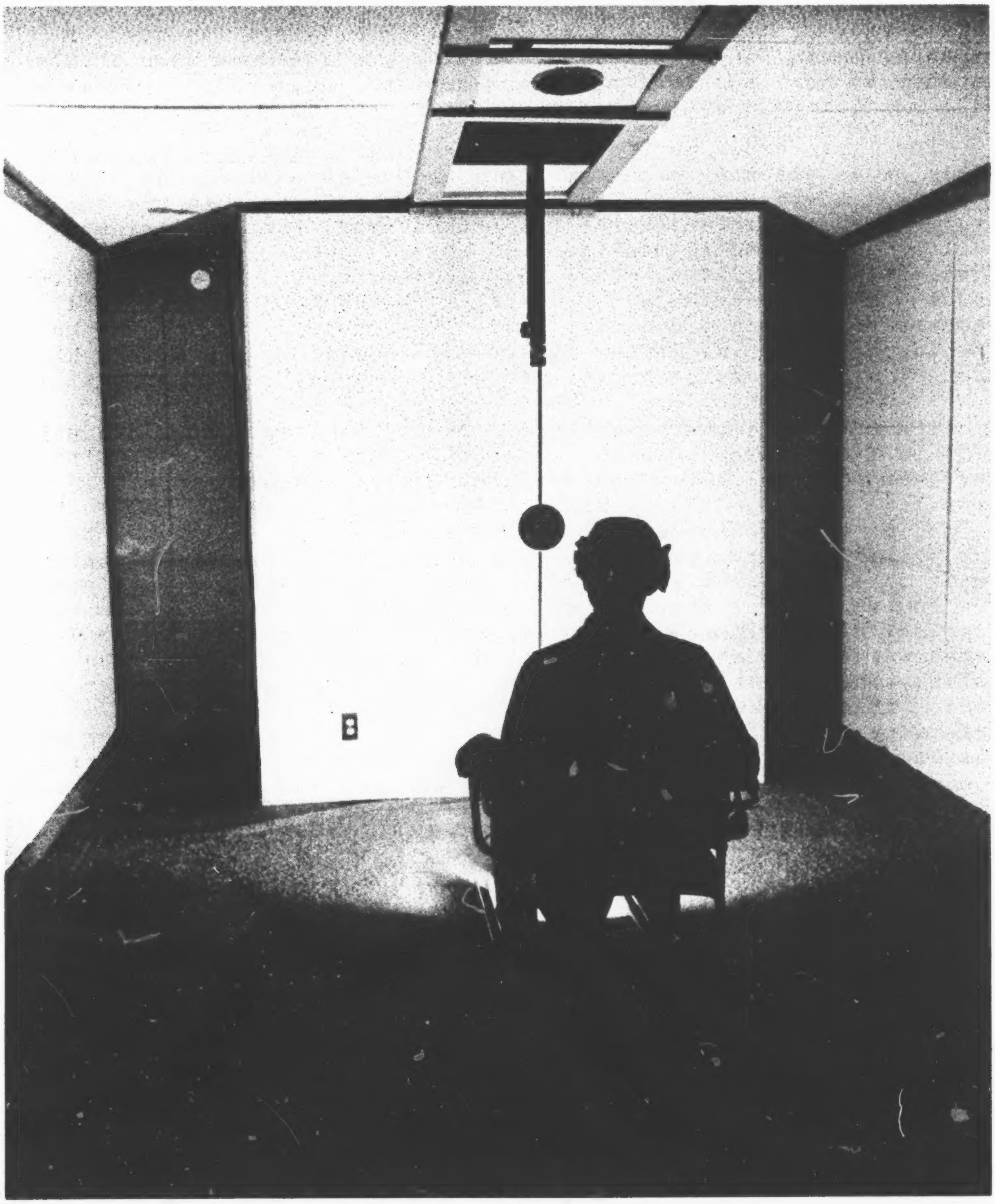

Figure 1. View of the Subject and Apparatus with Target in Position for Judgment.

iment. The warm-up session was used to stabilize the subject's decision criterion and hold false positive judgments below 20 percent. By setting such a criterion, it was hoped to obtain comparable measures for all subjects. The false positive is the response "yes" meaning "there is a target in front of me," when in reality there is not. This measure serves as a check against 100 percent "yes" guesses, and is the basis for estimating the criterion of echo information necessary for the subject to emit a "yes" response. The subjects averaged 7.8 percent false positive responses with a standard deviation of 2.9 percent.

The amount of training necessary to progress from the initial 19.4 in diameter target to the range of 5 targets used for the first response threshold measurements varied among subjects. Once the asymptote of training had been reached, they maintained a consistent level of performance.

The echo ranging noises used by the subjects were all different. The signal produced by subject *CB* was a harsh "F" sound which was pulsed several times and followed by "hello, hello." *DB* created a tongue click "tsk, tsk, tsk" followed by an extended "ss-sixes, sseven, eight." *DD* made an intense tongue click which was sharp and repetitive, originating from the roof of his mouth. *JP* uttered a variety of sounds, including tongue clicks, lip smacks, and throat clearing. *WG* used a "hiss-hiss" which was elongated up to 5 seconds, then repeated. In each case, subjects turned their heads spontaneously from side to side, sending the signal back and forth across and beyond the targets in a sort of auditory scanning similar to that reported by Kellogg (1). Once a pattern of noise was established for use as an echo signal, the subjects were required to use it consistently throughout the experiments.

Response curves in Figure 2 show the relationship between target size and percentage of "yes" responses for 100 presentations of each target at a given distance. These results show that echo acuity by blind subjects is a function of both target size and the distance between subject and target, i.e., the farther the distance, the larger the target must be in order to be detected. A response threshold target was calculated for each subject and distance. This was a target size which was estimated to be detected 50percent of its presentation at a given distance.

As a measurements were obtained it became apparent that the auditory angles subtended by these threshold targets for all subjects showed relatively little variability. This observation lead to the hypothesis that a mean auditory angle for the group might provide a prediction of threshold targets at any distance. Support was gathered for this position when an interpolated group theshold target was found for each distance and its auditory angle calculated. The mean auditory angle for all distances and subjects was 4.63 degrees with a standard deviation of 0.21 degree. This angle has been drawn to scale and the group theshold targets were fitted

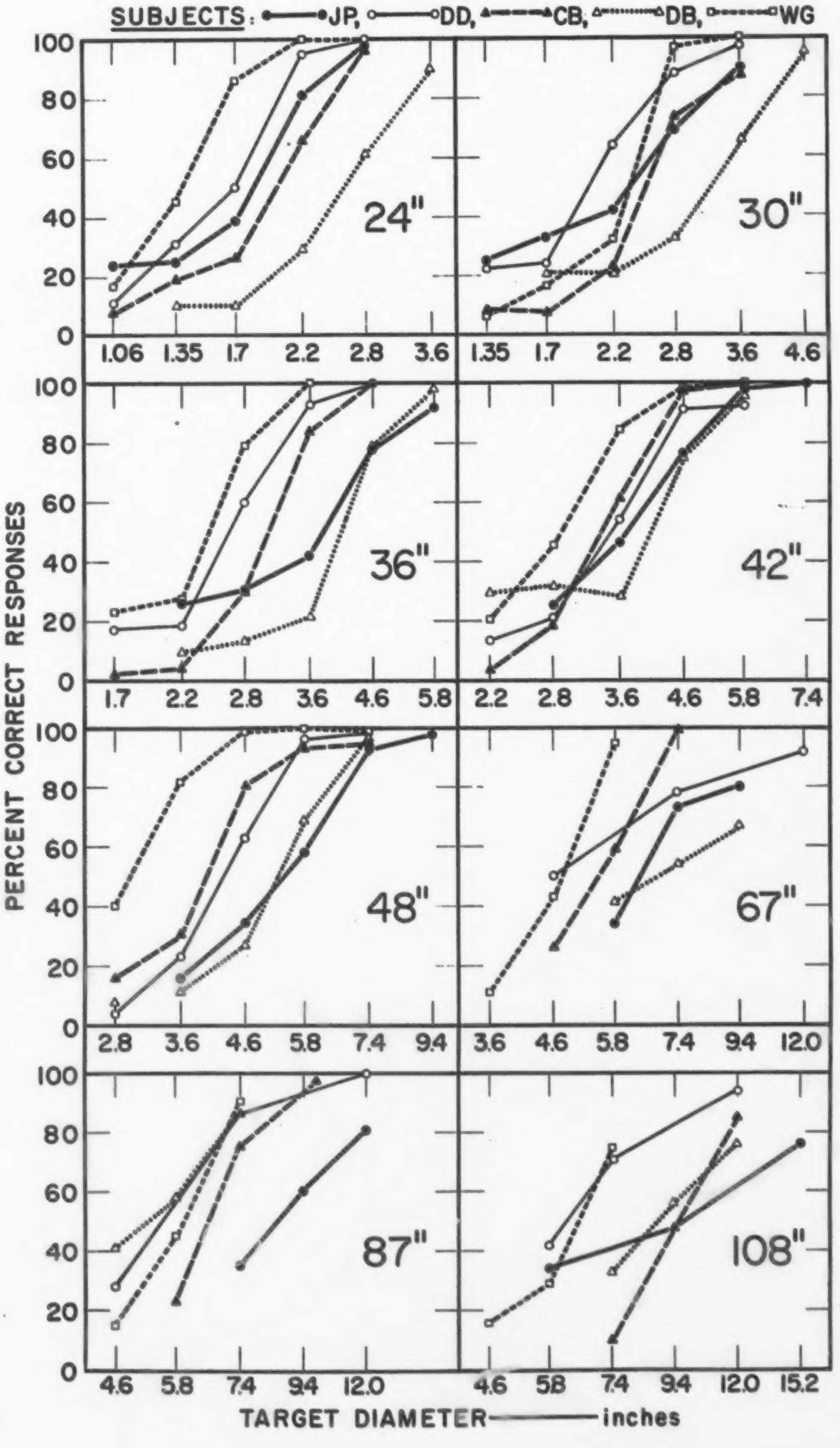

Figure 2. Percentage of Correct Responses by Each Subject for a Given Target Size at All Distances.

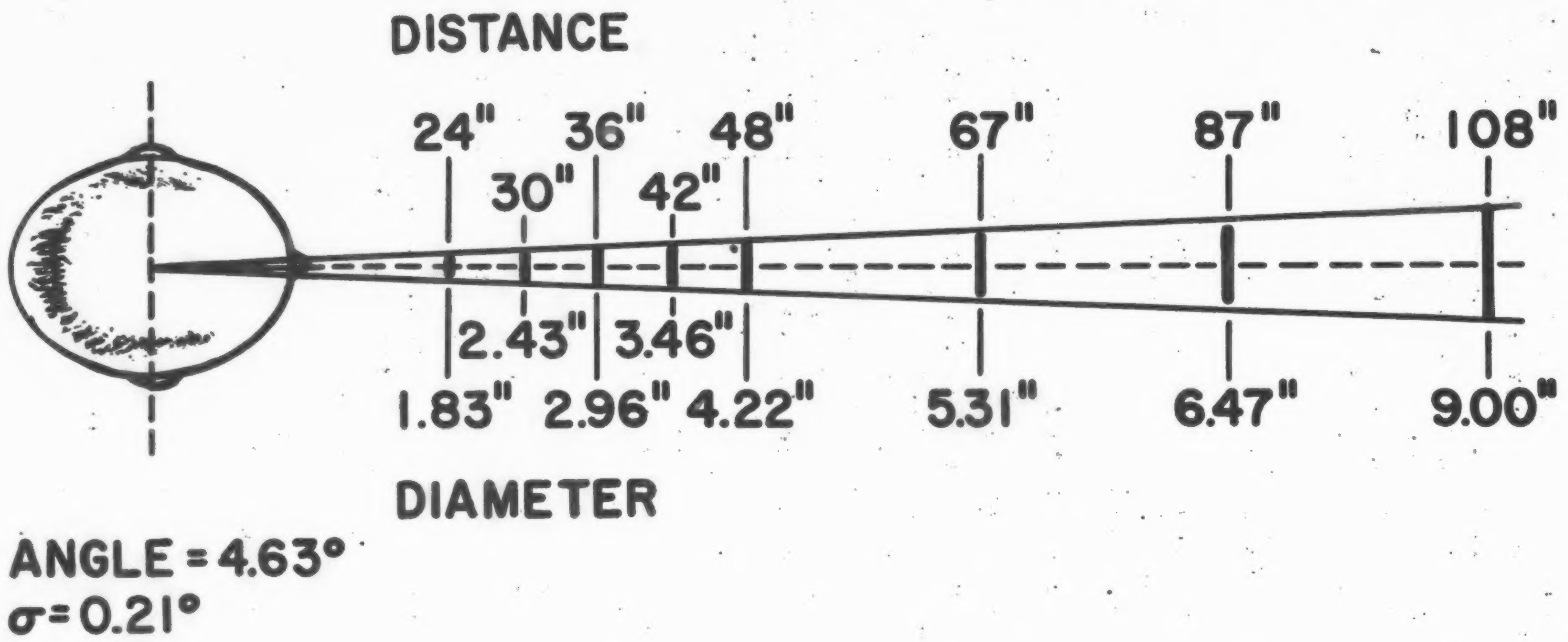
DISTANCE
24"
30"
36"
42"
48"
67"
87"
108"
1.83"
2.43"
2.96"
3.46"
4.22"
5.31"
6.47"
9.00"
DIAMETER
ANGLE = 4.63°
σ = 0.21°

Figure 3. Group Threshold Targets at all Distances Fitted to the Mean Auditory Angle.

to it in Figure 3. It appears from these results that the auditory angle subtended by the target in front of the subject is a good predictor of the subject's response threshold at any distance through 108 in.

Since the auditory angle is regarded as an arc on the horizontal plane at the height of the ears, it seemed likely that width may have been an important factor in detection of the targets. The above hypothesis is consistent with the lateral head movements used by all subjects to "find the edges of the target." Certainly there is some interaction of width, height, and total area in order for sufficient echo information to be obtained. This hypothesis is tested in an experiment which follows later.

SIZE DISCRIMINATION

The next experiment dealt with the question of how large a change must be made in a target which is easily detected in order for this size change to be noticed.

The subjects were tested at three distances from the targets: 24 in, 36 in, and 48 in. At each distance, a range of 5 target sizes was presented to the subject by the method of constant stimuli. In this procedure the middle-sized target of the range designated as a standard stimulus (*ST*). This standard was randomly compared with itself and each of the other targets until each pairing had occurred 60 times. The order of presentation was counterbalanced with the standard occurring first and second on an equal number of trials. The subjects were instructed to emit their now standardized echo detection noise during each trial, and to make a judgment as to whether the second target of the pair was "larger" or "smaller" than the first. If, as a result, this second target seemed larger than the first, the correct subject response was "larger" and vice versa.

Each range of targets was composed of: a) the middle target (*St*), b) 2 targets which deviated from *St* by plus or minus a given number of units in diameter (each unit equaled 0.1 in), and c) 2 targets deviating plus or minus twice as many units as in b). The subject-to-target distance and individual subject's skill determined how large a standard target was used. No great variation between subjects occurred, as may be seen in Fibure 4.

Figure 4 relates target size to the probability of a "smaller" judgment by each subject at the three distances.

SHAPE AND DIAMETER

It had been hypothesized that the width of a target might be of primary importance as a cue to detection. This question was dealt with in the next study.

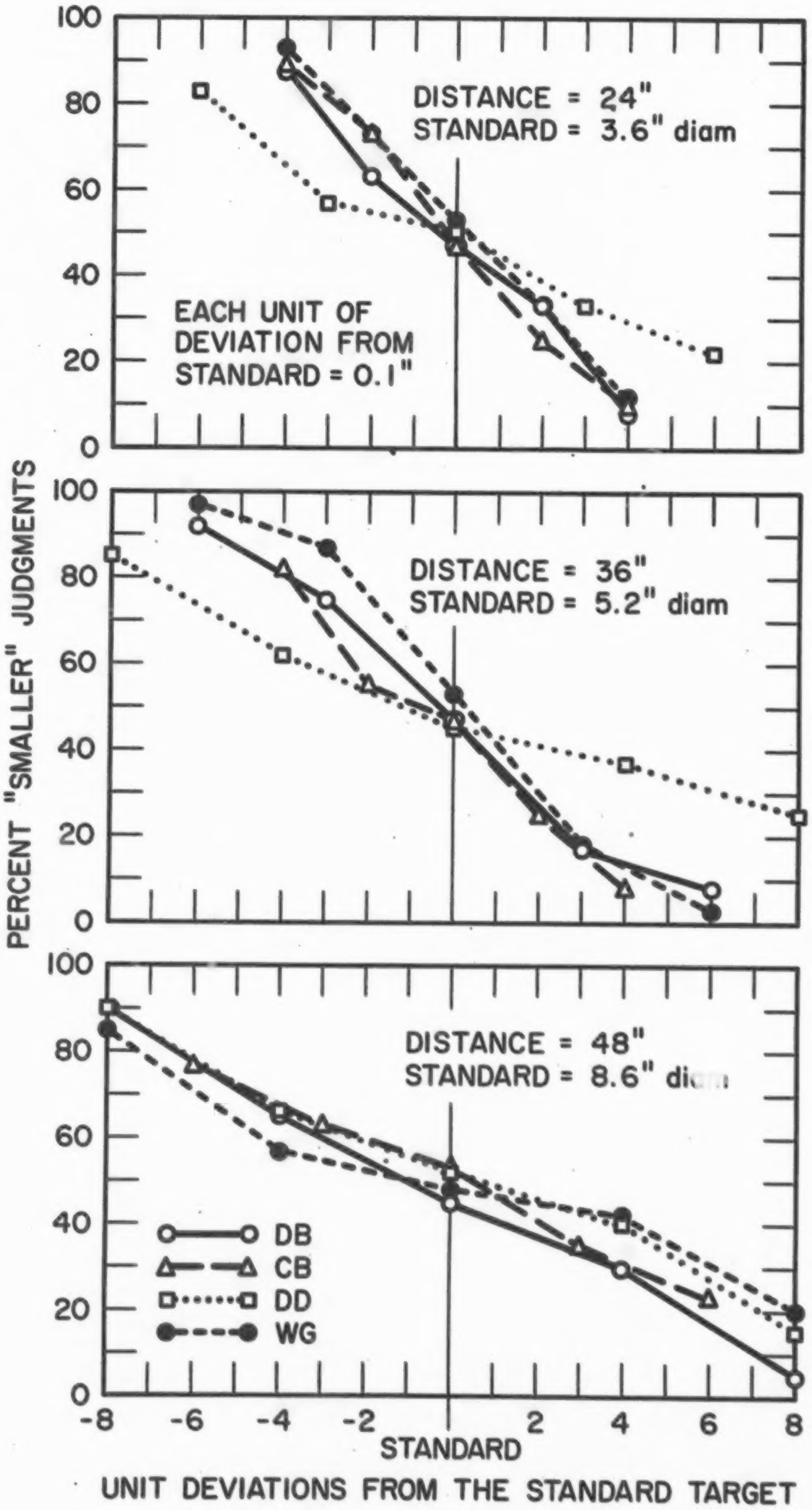

Figure 4. Percentage "Smaller" Judgments by Each Subject When a Target Was Repeatedly Compared with the Standard at a Given Distance.

In the course of the preceding psychophysical measurements, it was observed that the probability of detection was correlated with the auditory angle subtended by the target. At the same time, it was noted that in order to look for the targets, all subjects moved their heads from side to side on the horizontal plane while emitting their typical sonar vocalization. The hypothesis arising from these observations was that detection skill was closely related to the horizontal dimension of the target. Since all targets used in the threshold estimates were circular, the separation of width and area dimensions was impossible. To assess the significance of the horizontal dimension independent of area, an experiment was performed which used rectangular targets of constant area.

Targets presented were all 16 square in in surface area. This area was chosen because in previous tests subjects were found to detect a circular target of similar size on more than 25 percent and less than 75 percent of the trials at a distance of 48 in. Thus, variations in frequency of detection could be observed when some experimental manipulation of the targets was performed. Targets presented were: a 16 square in circle, a 4 by 4 in square, a 2 by 8 in oblong, and a 1 by 16 in oblong. The 2 by 8 in and 1 by 16 in targets were presented with their long dimension in both horizontal and vertical planes. The series also included no-target trials as in previously mentioned threshold measurements. These seven target conditions were presented 100 trials each and in random order. Subjects were instructed to respond "yes" or "no" with respect to their judgment as to the presence or absence of a target on each trial.

In order to analyze the results, an analysis of variance for repeated measures of the same subjects was performed. This assessed the effect of varying the dimensions and orientation of the rectangles on the frequency of correct responses. The only significant effect was found to be due to the dimension variable ($p <.01$). The direction of this difference was a significant decrease in the frequency of detections as the ratio of the rectangle's width to length dimensions increased. That is, the 2 by 8 in target was perceived less than the 4 by 4 in, and the 1 by 16 in less than the 2 by 8 in target. No significant effect upon accuracy of detection occurred as a result of orienting the long dimension of the 2 by 8 and 1 by 16 targets to either the horizontal or vertical plane.

The results of this experiment indicated that as the rectangular targets became elongated detection was more difficult. It can be seen that as the targets become elongated the angle at which the vocalized sonar signal hits the target becomes greater and reflected energy is directed away from the ears. To test this hypothesis, therefore, the 2 by 8 in and 1 by 16 in targets were bent to the radius of the subject's distance from the target. The same procedures as before were than repeated, with the exception that the 2 by 8 in and 1 by 16 in targets were now bent to a radius of 48 in.

As a control for possible learning effects, the procedure for the previous test was rerun with flat targets after completing the bent target series.

No significant increment was found in the rate of detection attributable to practice or learning effects. A significant *t* ($p < .01$) was found, however, in support of the hypothesis with regard to the 1 by 16 in targets, i.e., the curved 1 by 16 in targets were detected significantly more often than the flat 1 by 16 in targets. The 2 by 8 in bent targets were detected more often than their flat counterparts but this difference was not significant.

Figure 5 shows the relationship of target dimensions to frequency of dection for flat and curved targets.

Although previous experimentation and observation suggested that the auditory angle or width dimension was particularly important to the detection of targets presented to subjects, no support for this hypothesis could be found. Apparently, the horizontal or vertical orientation of targets does not differentially effect detection ability. An important factor was found to be the effect of the target surface parameters upon the sonar signal. A loss of echo energy due to sound being reflected away from the ears was a major variable in determining the accuracy of detection. The ability to detect objects is positively correlated with the amount of energy reflected by the target surface to the subject's ears. It is concluded, therefore, that the features of the target which govern the direction and amplitude of the echo stimuli must be given consideration in the planning of echo detection and echo identification studies.

GEOMETRIC SHAPE DISCRIMINATION

An additional question we have asked, but have as yet not answered to our satisfaction, is: Can the subject discriminate between geometric shapes of equal area? Can he, for instance, tell a trapezoid from a hexagon from a circle, etc.? We have approached this problem from the point of view that the subject should have as little information about the target as possible. Hence, we have designated the targets in current use as *A, B,* and *C*. The procedures pursued in this experiment are similar to those previously mentioned. A basic difference in this case, however, is that after each judgment, i.e., the saying of *"A,"* or *"B,"* or *"C,"* the subject is given knowledge of the actual target presented.

It is as yet too early to draw conclusions as to how successful our subjects will be at solving this problem. Suffice it to say that two of them have conquered the *ABC* problem with 80 percent accuracy. This, of course, leaves two who have not reached this level of proficiency. They have not, however, been working as long at it as the former two. Should we succeed in this demonstration, further tests will be necessary to evaluate the means by which this discrimination is made and to what extent generalization

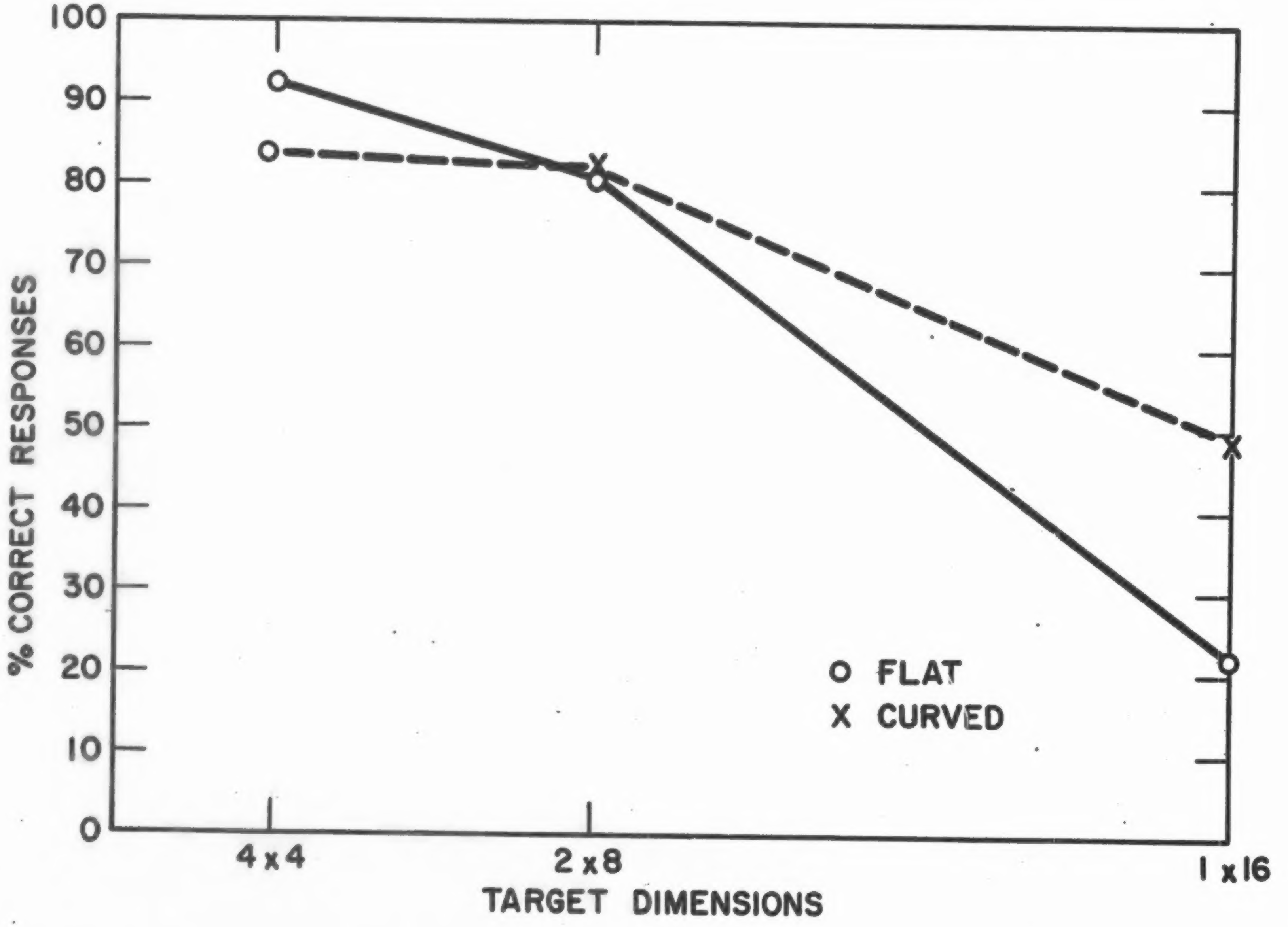

Figure 5. Percentage of Correct Detections for Each Flat and Curved Rectangle.

can be obtained to similar targets of different dimensions.

In conclusion it must be emphasized that these experiments are part of a basic research project. No practical applications for the research are envisaged at this point. A large number of additional studies are to be made. No data has been collected, for example, concerning the nature of the individualized vocalizations of our subjects. The relationship which exists between the physics of these signals and the resulting perceptions should provide useful insights into the basic parameters of the echo identification tasks.

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A PROPOSAL FOR A STATE-WIDE FRAMEWORK OF ORIENTATION-MOBILITY INSTRUCTION

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For the last three years, part of my energy has been directed toward the problem of how to create an administrative framework which would provide orientation and mobility instruction to blind students in the public schools on a statewide basis. As part of its coordinating function, the Alameda County School Department applied for and received federal grant RD-1168-D from the Department of Health, Education, and Welfare, Vocational Rehabilitation Administration, in order to test certain ideas in practice. Based on our experience, it is now possible to propose a state-wide framework of orientation and mobility instruction.

Now the emphasis is on the term "state-wide." If you have a population of several million in a small geographical area, solutions are easier. The really difficult problems come into existence when an attempt is made to provide a plan for the state as a whole. Consequently, some types of special education programs in California can be found only in the big cities, whereas vast geographical areas have almost no services at all.

Some workers accept this as a necessary fact of life. They say that people with blind children tend to move to the cities and, consequently, there is not really an obligation to move the services to the country. Undoubtedly this shifting of families to the services exists. Perhaps for many families it does not impose a hardship. Conceivably a gas station operator in a mountain valley could move his family to a city and operate a gas station without any serious loss in income.

In other instances there might be a real hardship. I can imagine, for example, that hardship would occur to a man whose speciality was grading lumber in one of our sawmills in the mountains. If one of his children is blinded, he might be faced with the choice of continuing his highly paid skilled work and having his child do without some needed services, or moving away from the place where his skills are valuable to an area where he becomes an unskilled or semi-skilled laborer. Furthermore, the family preferences and tradition of living in a small town or rural area have human, if not dollar, value. Somehow it does not seem quite fair to say that because the accident of blindness occurs in a family, that family should break its ties with the community in which it exists and move to a large city.

One of the principles of special education is to disturb the normal life of the student as little as possible; a second principle is to prepare him for a normal life to the fullest extent. This is in contradiction to the state institution trend of the past. We now believe that some alienation is caused to a person who is made to leave his neighborhood and peer group and family at an age when the normal thing is for the youngster to be with his own family and in his own neighborhood and school.

The reasoning for such a practice is psychological. But whatever its merits, the policy creates a problem for the special education administrator: to what extent can we make services available to children who need them with a minimum disruption of their normal daily life, and still operate within the funds and personnel available? And when *new* services are needed, how can they be distrubuted to the children who need them without complicated administrative arrangements? In this instance, the question is what is a workable administrative plan which will bring orientation-mobility instruction to the blind children in all the communities of California?

A concerned group of specialists put the question into a grant application and the Vocational Rehabilitation Administration generously provided funds to seek an answer. During the two years this grant has been operating, we have come to the realization that orientation mobility skills are part of the necessary learning skills of the student just like reading, writing, and arithmetic. In fact, we are almost ready to assert that orientation-mobility instruction is a specialized form of physical education, a purposeful physical education which might well begin when the child starts school and which should have its culmination in intensive individual field work during early adolescence. The goal would not only be independence in travel for as many children as possible, but also better educated graduates - not merely blind workers who can get to and from work, but informed citizens who have explored and enjoyed their world, testing reality through their own direct experience.

The Advisory Committee for the demonstration is composed of administrators of all of the public school programs for the blind in Alameda and Contra Costa Counties of California, together with representatives of the state Department of Education, San Francisco State College, the Department of Vocational Rehabilitation, and of the county school departments involved.

The Advisory Committee decided to add orientation-mobility instruction to whatever program the blind adolescents were receiving from their schools. This required at the outset *that the orientation-mobility instructor should be itinerant* - the first principle. It was further decided that this instruction should be part of the regular school day rather than an afternoon, evening, or weekend program.

The second principle - *that students be taught as part of their regular school program* - raised problems of scheduling. Not only did the instructor have to move from one school to another, but he had to arrive at each school at times when the blind student was available for instruction. The attempt was made to interrupt the "solid" subjects as little as possible. Some of the students had study halls or counseling periods, and all of them had time set aside for physical education (in some situations this consisted of lessons in chess and checkers). California law requires physical education for each child each day.

A third principle was adopted as a temporary humanitarian policy. *The older students in the program were to be taught first* and instruction for the younger ones was to be delayed. The obvious reason was that without this policy the present seniors might graduate without receiving orientation-mobility instruction. First priority is given to juniors and seniors, but as the demonstration has progressed, the belief of the Advisory Committee has grown stronger that the typical optimum time for such instruction is junior high school, with readiness activities needed from the cradle onward.

A fourth principle has been that *instruction would be given only on the written request of the parents, but that there be as little red tape as possible.* Instructors attempt to adapt themselves to local school district policies, and the local schools are not asked to put the orientation-mobility program ahead of their own policies and procedures. School districts do not surrender any administrative perogatives, and the orientation-mobility instructors function as if they are local staff members for the time they are in a school. No contracts are necessary. No local funds or personnel are encumbered.

A fifth principle was that the working area of the instructor should be based upon where the students are, upon the school schedule of the students, and upon travel time between schools. In other words, flexibility was a principle. The instructors were not hired to serve a given set of school districts, but to provide as much instruction as they could in each working day. Artificial boundaries of school districts and counties should not be the basis for the area covered by the instructors. The instructor is not so much an employee of a program as he is a provider of service to students. The instruction is provided to children not to districts or counties.

A sixth principle was that some administrative unit should provide a home office for the instructors. Policies governing the staff in that office would in general apply to these instructors. Here they would receive their mail, dictate their correspondence, have a headquarters for supplies, enjoy library services, write their reports, and do their planning. They would receive the side benefits of professional employment such as retirement, sick leave, and an opportunity to participate in matters concerning education as a whole through occasional staff meetings with fellow educators. Friday afternoons have been set aside for these office activities. A secretary in the office has, as part of her additional duties, the maintaining of a schedule for each of the instructors so that they can be reached in the field at any time. The facilities of the publication department, photography staff, professional library, and credential and finance office are available to the instructors through this arrangement.

A seventh policy grew from the following realities. Since instructors were to be part of the special education team, since they would participate in making decisions about students, since they needed to create their own instructional aids, since they needed to know general principles of learning, child development, and the psychology of blindness in order to make proper judgments about how and when to adapt procedures to the varying needs of individual children, since they needed the respect and acceptance of a professional community, since they must consult with parents and advise other educators on how to blend orientation-mobility readiness and reenforcement activities into the curriculum, because they must understand the general purposes of the institution to which they are allied - the Advisory Committee set the policy that *orientation-mobility teachers be credentialed.*

For the same and related reasons, it was always assumed in this demonstration that orientation-mobility instruction is an integral part of education and should be administered within education.

With this set of decisions, the problem was to find out how many students or how large a population or geographical area an instructor could cover. After two years' work by two teachers, the pool of older students in Alameda and Contra Costa Counties has been fairly well worked through. In fact, only one-third of the students taught have been age 16 or above. Most of those available for instruction in the two counties next year will be seventh or eighth graders. The resource teachers in the districts believe that these students could afford to wait an additional year while older students in hitherto unserved areas are taught.

At the most recent meeting, March 2, 1965, the Advisory Committee authorized the project staff to add additional geographical areas to its instructional program. Plans will be made to cover at least parts of two additional adjacent counties which are just as close to the Alameda County School Department central office as much of the area presently served.

It appears on the basis of our experience that one orientation-mobility instructor can serve a population of approximately one million people if they are no more scattered than the population is in Alameda and Contra Costa Counties. If the population served is very much smaller than that, the orientation-mobility instructor will find himself with a diminishing number of blind students to teach. Instructors could be staffed at a central point serving as many as four or five surrounding counties. They could concentrate in one quadrant during one semester or year, and move to another quadrant in the next semester or year. Thus, by rotation, a wide geographical area and population could be served without shifting the instructor's base of operations each year.

In very dense populations such as the six million in Los Angeles County, there would be less distance between students and a consequent efficiency in the use of instructors' time would result. Perhaps four orientation-mobility instructors could serve Los Angeles County. It will be interesting to compare this projection of our own experience with the findings made by the people in Los Angeles.

A special problem will exist in northern California, when nine or ten of the northernmost counties combined do not total a population workload for one orientation-mobility instructor. This area, however, divides into natural geographic regions. Moving from west to east, there is first the coast with its villages; there are the scarcely inhabited coast range mountains, followed by the valley with a number of middle-size towns; and finally the Sierras with a scattering of villages. A solution for this northern region might be to have one instructor who would be willing to live for a year first in the valley, and then for a year along the coast, shifting his base of operations and serving parts of this region by rotation. With the growing popularity of mobile homes in California and with the natural beauty and romantic appeal of this part of our state, it seems likely that an instructor could be found who would be willing to tour this circuit.

With the foregoing as prologue, it is possible now to outline a proposed state plan, which could begin with the orientation program presently existing in the East Bay and Los Angeles, and grow to full state coverage within a period of three or four years. A modest estimate is that 15 orientation-mobility instructors, properly spaced throughout the state, could serve the total population of blind students who lack travel vision. If there are about 1600 legally blind public school students registered in California, and approximately half of these have sufficient vision to use print in addition to or in place of braille, the number of students with top priority for orientation-mobility instruction will be from 800 to 1000. These are divided into the 13 grades from kindergarten to twelfth, so that we can expect approximately 75 seniors to be graduating each year. With a steady flow of 75 students, 15 orientation-mobility instructors should be able, first of all, to catch up on the backlog, and then begin to do a thorough job with early adolescents.

There will be a need for one additional position to serve as a state-wide coordinator for this program. The duties of this central position will be to negotiate the budgets and allocations each year, to review and adjust the geographical areas to be covered by each instructor (since these will fluctuate each year), to help identify and qualify students for the programs, to ensure quality instruction, and to report on the program.

It is possible that the orientation-mobility instructor in the Sacramento area, at least in the early years of the program, could be a part-time orientation and mobility instructor and a part-time state coordinator. Presumably with fully trained credentialed special educators doing the orientation-mobility instruction, close daily supervision will not be necessary.

Perhaps the estimate of 15 instructors plus a central position is too low, but an estimate of 20 positions and 2 coordinators is high. To give substance to this plan, we have drafted AB-271, which was introduced by Assemblyman Carlos Bee of Hayward. The bill as introduced declares that blind secondary school students were entitled to orientation-mobility instruction. It described the qualifications and eligibility of the students, called for instructors to have teaching credentials, outlined a job description, provided funding of the program, and provided local policy making but state supervision of quality. One major obstacle to the passage of this bill is that it calls for an appropriation of funds in a year when the Governor has insisted that there be no new expenditure. A number of amendments have been offered and a subcommittee of the Advisory Committee will consider these within the next ten days. A draft of these amendments is available to those interested.

The bill anticipates federal assistance. Wording in the bill calling for the Department of Education to *consult* with the Department of Rehabilitation has caused some objections. The attempt of the wording is to prevent the overlapping of services by the two departments. The annual consultation would allow representatives from the two departments to state precisely the limits of services intended by their departments for each year. Unfortunately this wording is interpreted by some to have the opposite meaning, and since the wording is confusing, it probably should be left out.

The requirement in the bill that the instructors be professional educators with credentials has brought criticism here and there. At the present time, the bill has been heard once. It was held without prejudice and could be heard again with or without amendents.

The Advisory Committee for the grant was unanimous on March 2 in its belief that the bill should be amended and passed. A subcommittee was established by the advisory group to consider possible amendments and to seek further action on the bill.

As was pointed out in the hearing before the Assembly Education Committee, there is no wording in this bill which interferes with any contracts that any district or county school department may wish to make with other departments. Neither is there a requirement that a district take part in this program. Neither is any parent compelled to authorize his youngster to be instructed. The provisions are permissive, but unlike other permissive legislature in California it provides for a state-wide plan rather than a hit-or-miss establishment of programs.

Historically, in California, interested districts or county offices have introduced what amounts to privileged legislation. Bills are introduced which fit local circumstances and programs are established in favored locations, but with the vast majority of the state left without a program. AB-271 is so worded that a state-wide coverage will be fostered. The entitlement is to children rather than to districts or counties. Yet the funding is not on a per student basis - the typical plan in California and a plan which places districts with the best and most expensive programs at a disadvantage. On the contrary, AB-271 ensures that the program will exist and that the costs will be paid without hazards either to standards or to the financial stablility of districts. The present unforeseeable deficits which occur each year under financing of special education in California cause many thoughtful school boards to stay out of special education programs when they can.

The plan in AB-271 merely extends what has been found to work in the demonstration to a state-wide basis. It is also believed that this plan is adaptable to other states. We undertook a problem, developed a workable solution, and are presently engaged in making that solution permanently available.

ORIENTATION AND MOBILITY PROJECTS AT THE CALIFORNIA STATE COLLEGE AT LOS ANGELES*

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INTRODUCTION

The present rather widespread interest in the field of orientation and mobility for blind youth is undoubtedly due to a number of factors. Studies concerned with the developmental characteristics of blind children point to their essential need for mobility if developmental tasks are to be met successfully. Development of feelings of self-worth involve experiencing relative physical independence, as does future vocational breadth of choice and opportunity. The farseeing efforts of training centers, such as San Francisco State College, with sponsorship by the American Foundation for the Blind, The Seeing Eye, Inc., and The Vocational Rehabilitation Administration, to offer workshops for teachers in orientation and mobility, has created an interest in and an awareness of the need for and potentialities of such training for blind children. Then, certainly, the movement of great numbers of the "RLF bulge" babies into upper elementary and secondary schools has impelled those concerned with their education to begin making an effort to satisfy these needs.

LOS ANGELES COUNTY MOBILITY PROJECT

Influenced by all of these factors, a group of educators, representing programs of education for blind children in the public schools of Los Angeles County, asked Dr. Francis E. Lord, Chairman, Department of Special Education, California State College at Los Angeles, to initiate a proposal for a planning grant to study the orientation and mobility needs of the blind youth of Los Angeles County.

The grant award was made in February of 1964, Vocational Rehabilitation Administration Project RD-1406-S, "Los Angeles County Mobility Project." Due to prior commitments of the staff, the grant was put into effect June 1, 1964 under the direction of Dr.

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* This paper was not read at the conference by Miss Manshardt, as originally planned, but was submitted for publication at that time.

Francis E. Lord. Lawrence Blaha was employed as principal investigator and mobility specialist, and Miss Clarice Manshardt as research associate and educational consultant. An advisory committee to the project, composed of appropriate representatives from the schools and private agencies serving blind youth, was established.

Objectives and Procedures

The objectives of the planning grant are, first, the development of a master plan for a complete program of mobility instruction for children and youth of Los Angeles County. In order to accomplish this primary objective the following must be attained:

1) a survey of the needs for mobility instruction in Los Angeles County;

2) a survey of the various agencies serving blind children and youth in relation to their future role in the development of a program of orientation and mobility instruction;

3) ways found to provide added meaning to the planning through interpretation and demonstration to the community, relative to the service which is projected;

4) the definition of types and extent of services needed; and

5) the definition of administrative problems as related to personnel needs, financial support, overall structure, student selection procedures, and scheduling.

After developing instruments for the purpose of obtaining desire data a formulation of detailed procedures and methodology has been developed. The procedures fall into five major areas of investigation:

1) to survey the need by means of data from the California State Department of Education and from questionnaires to be used with students in attendance in the schools of the county;

2) to survey the various agencies (public and private) to determine the role they might play in the establishment of the program;

3) to present a planned program of interpretation of the program through demonstration to develop community understanding, awareness, and support;*

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* At least three high school blind students will be selected to begin instruction in orientation and mobility, representing the dif-

4) to conduct workshops for teachers in basic orientation and mobility skills;

5) to develop an administrative structure for the countywide program and to investigate and suggest procedures relating to specialized personnel, gradual assumption of financial responsibility, and legislation needed.

Analysis of Data

Analysis of the data secured by questionnaire from students and their teachers and parents is now in progress. Our sample consists of approximately 300 cases of school age children with a visual acuity of 5/200 or less. Characteristics of the population of elementary and secondary students are being studied as a means of supporting comprehensive and long range planning for the program.

Among the major factors that immediately begin to emerge in our study were:

1) the magnitude of the need in terms of sheer student population;

2) the need for regional planning within the county, due to its complexity, in order to find the most functional and economical use of trained personnel;

3) the challenge of further exploration into the most effective "curriculum" of orientation and mobility for this age group;

4) the need to define roles of various persons in the orientation and mobility training of the blind child;

5) the possibility that phases of the program should be linked to the early development of the blind child.

Accordingly, the staff developed and submitted companion proposals for future demonstration and research.

MOBILITY INSTRUCTION FOR BLIND YOUTH UTILIZING PARENTS, TEACHERS AND MOBILITY SPECIALISTS

The first proposal was submitted to the Vocational Rehabilitation

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ferent geographic areas of this vast County of Los Angeles. These students will be used to demonstrate the skills and importance of the program.

Administration and was approved February 1965, to become effective July 1, 1965. It is Demonstration Grant RD-1784-S, entitled "Mobility Instruction for Blind Youth Utilizing Parents, Teachers and Mobility Specialists."

Objectives and Procedures

The primary objective of this grant is to demonstrate a plan of orientation and mobility instruction combining the resources of parents and teachers of visually handicapped youth and well-trained mobility specialist. The plan will serve secondary school age youth, grades 7 to 12, and post high school young adults of Los Angeles County in the location best suited to their needs. A secondary objective is the development of an instructional model which will include: a carefully designed teaching sequence; a method for maximum utilization of the services of parents, teachers, and mobility specialists; the development of a schedule of evaluation and follow-up with a program of reteaching of skills on a longitudinal basis; experimentation with differentiations of learning sequences and experiences for congenitally and adventitiously blind persons; demonstrations of the premise that training in *basic skills* of orientation and mobility should precede training in the use of a mobility device such as the long cane; and the development of a systematic conference plan between the parents of students and the mobility specialist. The population sample will include adolescents enrolled in grades 7 through 12 or just post high school who have sufficient social maturity to profit from instruction, can give evidence of sufficient energy and physical health to undertake the training, possess little or no usable travel vision, and have 5/200 or less vision in the better eye after correction.

Proposed procedures include a proposal that four fully qualified mobility specialists will be assigned for full time instruction for a period of three years to provide orientation and mobility instruction to students in grades 7 through 12 and to young adults graduating from the schools of Los Angeles County. In addition, a principal investigator, who is also an orientation and mobility specialist, will coordinate the services and give some direct service. On the basis of data secured through the California State College Orientation and Mobility Planning Project, "Los Angeles County Mobility Project" RD-1406-S, service regions will be established comprising a feasible grouping of schools in terms of numbers of students to be served and reasonable travel distance related to efficient utilization of the mobility specialist's time. The present planning grant has provided the proposed project with spot maps detailing school and home locations of the subjects as well as appropriate traffic and shopping areas adjacent to these above-mentioned locations. Further, the planning grant has provided a list of screened subjects along with extensive case record data for each.

A careful system of evaluation of the progress of each subject will be applied, utilizing a screening check list related to performance in orientation and mobility skills; a daily check list during the training period; and a performance test by the principal investigator or other qualified person.

During the summer of 1965 the project staff will outline a detailed series of lesson guides to be used during the instructional period. These will be developed into five units which will be summarized under specific procedures of this proposal. A report will be made describing all phases of the demonstrations and summarizing the progress of the students. Results of the findings of the proposed demonstrations will be used to formulate a guide for orientation and mobility instruction which should be of value to other programs throughout the country.

Analysis of Data

Analysis of the data collected by the present project and supplied by the California State Department of Education as of January 1964 reveals that, of the 151 adolescents enrolled in secondary public school programs in Los Angeles County, 19 have light perception only, 66 have no light perception, 6 have constricted field, 7 have prostheses, and 4 have enucleation. All others have 5/200 or less visual acuity in the better eye after correction. The number of subjects from this group to be served each year will be 40.

IDENTIFICATION OF ORIENTATION AND MOBILITY SKILLS RELATING TO DEVELOPMENTAL TASKS FOR YOUNG BLIND CHILDREN

The companion proposal is a research proposal submitted to the United States Office of Education. We believe its area of inquiry is highly provocative. It is entitled "Indentification of Orientation and Mobility Skills Relating to Developmental Tasks for Young Blind Children."

Objectives and Procedures

The objectives are to answer the following questions:

1. What are the developmental tasks relating to travel for young blind children?

2. What are the orientation and mobility skills required for these developmental tasks for young blind children?

3. What are the related learnings essential in the perfor-

mance of each of these orientation and mobility skills? What are the intellectual, psychological, and social components of each developmental task?

The procedures include appropriate developmental tasks being selected from the relevant studies of child development of normal children and arranged sequentially according to age levels from 2 to 12 years. A jury of experts will judge the appropriateness of the selection as related to the objectives of the study. Orientation and mobility skills and related learning will be identified and scaled sequentially, based on the developmental tasks. The literature, orientation and mobility specialists, experienced teachers of blind children, and comparison of good and poor performing blind children, will form resources for identification of orientation and mobility skills and learning.

Items in the scale will be validated through judgments of a jury of experts and through field trial with blind children.

SUMMARY

It is the hope of the project staff that, concurrent with the development of a comprehensive program of orientation and mobility instruction for Los Angeles County, some contribution can be made to the development of more effective techniques, and support provided for their most adequate and functional placement in the sequence of the blind child's life experiences.

SECTION IV

Summary and Concluding Remarks

SUMMARY

Milton D. Graham
American Foundation for the Blind
New York, New York

I had asked each of the participants, in this final session, to think of reactions that they had to individual presentations and to the conference in general. I shall begin with my own.

We began our first day with demographic problems. These are important to us in research because we need to define our population first: Who are they? How many are there? What are their characteristics? You are fortunate, in California, in having a great deal of information about your blind and severely visually impaired children; a great deal, but not enough, as the papers by Mr. Simmons and Dr. Parmalee suggested. Their surveys are just a beginning, as was the study in New York State a few years ago by Dr. William Cruikshank of Syracuse University. All three studies should cause us to ask, for example, why so many blind children are diagnosed as retarded and committed to institutions that can only provide them custodial care. Are they in fact retarded, or might they be understimulated with a principal mode of learning - vision - missing? We learned from Mr. Simmons that about one blind child in four in the state of California is committed to custodial care. That this should be so in a state known for its excellent health and education services can only be called shocking. And if it is happening in California, can other states in the Union say it is not happening?

Dr. Meyers, Dr. Parmalee, Miss McGuire, and Dr. Woodcock, among others, all commented at length and with concern about the need for thorough diagnoses, over time, from infancy and for standardized reports to all the appropriate services and agencies. The earlier that ophthalmologists, pediatricians, psychiatrists, and social workers exchange information on a visually impaired - and particularly a multiply-impaired - child, the more likely that child will benefit from the services available. The sooner we adopt standard definitions and notations to report a child's conditions, the more likely the appropriate services will be made available to him. Mr. Simmons noted and we have all experienced how fragmentary and misleading much of the medical data on record in hospitals, schools, and institutions is. For this reason I believe that Dr. Weisenheimer's suggestion is most valuable, that is, to use the new eye examination form of the National Society for the Prevention of Blindness and particularly the one designed for children. I know how valuable the adult form has been on a research project on war-blinded veterans. Certainly the children's form should be tried by everyone having any concern with visually impaired children.

Dr. Josephson, drawing on the experience of the Human Population Laboratory of the California State Department of Public Health and his own work in Cleveland, Ohio, has amply warned us that a "hidden" blind population exists, that is, a population that is unknown to services and agencies for the blind. This may be less true among children than among adults, but it is true nevertheless. I think that we should give serious consideration to Dr. Parmalee's plea for some rational reporting system that would involve ophthalmologists, pediatricians, and the social welfare services. The preschool child is all too often forgotten, as Miss Moor and others keep reminding us. Early detection is certainly a problem with which we need to come to grips.

Dr. Allan Scott also reminded us of something that we need to remember in connection with programs that will promote early detection, adequate diagnoses, and systematic reporting: blind children will always be with us not in decreasing numbers (as we occasionally hear), but in *increasing* numbers. First of all, blindness is a function of population: the more babies born, the more blind babies will be born, barring spectacular medical advances. The relative success in curbing retrolental fibroplasia, which still exists as a cause of blindness today, has caused some people to state mistakenly that the number of blind children must inevitably decrease. Unfortunately they are absolutely wrong. Dr. Scott has reminded us that medical science is not likely in the forseeable future to eliminate the genetic causes of blindness, and epidemics of rubella and toxic effects of drugs on mothers in early pregnancy are all too often brought to our attention. Then there are always the premature children whose numbers certainly will not decrease and whose susceptability to damage to the central nervous system is well known. No, the number of children - blind, visually multiply-handicapped - will increase; we must admit it and plan our research and our services accordingly.

Our second session, my notes tell me, was concerned with changes, values, confirmations, and dialogues in the field of education. Since I am not a specialist in that field I can announce my prejudices and biases quite openly, and let you who are specialists set the record right.

Both Miss Abel and Dr. Kohs reminded us that if anything characterizes our times and our educational world, it is change. We have a vast new technology and enormous sums of money for education available that are just beginning to make an impact. Grade school children speak of the new arithmetic, and teen-agers man atom-prowered submarines. Change has begun, and its potential for good and bad seems limitless. To me, the prospect that is offered us is both frightening and exciting: frightening, in that we adults may bog down in routine, pedestrian ideas and practices, and deny the children the full potentialities of our times; exciting, in that the prospects for change, for enrichment of our minds, are bounded only by our imagination and creativeness.

If times are changing, are values also changing? I personally would hope so. Both Dr. Kohs and Mr. Bowers have reminded us that the problem is not a change in basic values but the establishment of basic values where none existed; the asphalt jungle kids know nothing but the asphalt jungle, so to speak. I suppose that this is so, and that something needs to be done about it, if we are to realize the full potentials of our changing times. But I cannot help but worry about *who* will set these new values (if they are to be new) and *how* they will be set. It seems to me that it is an occupational hazard of teaching to be so absorbed in its minutiae - the day's routine, the day's problems - that one forgets that the purpose of teaching is to develop minds, not turn out carbon copies of one's own tastes and predilections. This may be harsh criticism, but I am disturbed in my occasional contacts with the educational world that so many teachers seem to lack insight into the processes of interaction between teacher and pupil and between pupil and pupil, interaction which seems vital to me in the educational process, particularly where physically impaired children are concerned. This may be far afield from the question that Dr. Kohs and Mr. Bowers have raised of inculcating values where none exist, but I submit it to you as an outsider's comment.

As to confirmation, Dr. Lowenfeld offered yesterday what seems to me to be a most valuable point. Many teachers of the blind - maybe most teachers - have been in relative isolation. They have had to develop their own methods and techniques without reference to their fellow teachers' experience. Research like Dr. Lowenfeld's on braille teaching methods will give them a point of reference. Are they using methods similar to other braille teachers? Are others using techniques from which they can benefit? Such research reports are most useful to the individual teacher and to program planners. Dr. Lowenfeld's study, I think, should serve as a model for other similar research undertakings.

Such confirmation of practice does not necessarily have to be communicated through research reports. Both Miss Abel and Mrs. Sibert, among others, have spent years reminding conferences, meetings, and classes that the child with low residual vision has a special problem that can be sucessfully solved given low vision aids, training in their use, and consultantion to their teachers and parents. They have offered a contagious example in their lectures and written materials which may encourage the teacher who may have developed some methods, or thought of developing them, for the pupil with some sight who may or may not be using the sight with efficiency.

Ultimately, with the work of persons like Dr. Lowenfeld, Miss Abel, and Mrs. Sibert, we may have some guidelines based on experimentation *and* experience, for determining the primary mode of reading that each visually impaired child should be taught, and the best supportive modes. Best of all, these guidelines will be based on evidence available to everyone for trial, test, and question.

This leads me directly into my last observation: on dialogue. Mr. Bowers and Mrs. Sibert called for more exchange of views between teacher and researcher, a more fruitful interchange, and understanding based on mutual respect. Certainly no one can disagree with this view, but implementing it is not so easy. Perhaps this very conference is a step in the right direction with a small group of specialists conferring on a specific topic. Certainly such presentations as Dr. Woodcock's bridge the gap: he has made himself understood to both researcher and practitioner. His work to this point with the multiply impaired child certainly struck responsive chords all around. In fact, he has contributed materially to what seems to me to be the unexpressed theme of this conference: with concerted effort on everyone's part, the impaired child has potentialities and capabilities that need to be developed, for he is not just a collection of problems and difficulties. Dr. Parmalee reminded us that this was so; so did Miss Abel, Mrs. Sibert, Dr. Woodcock, Miss McGuire and Dr. Meyers. Even the more basic research of Dr. Bliss on cutaneous sensing, and of Dr. Rice on obstacle sensing, has offered us glimmerings of how scientific inquiry may contribute to the realization of potentialities. Mr. Wurzburger and his colleagues are, of course, giving us practical demonstrations of the potential for mobility that some school children have.

All of these - the demonstration, the applied research, the basic research - need interpretation, experimentation, and use. Here the teacher, the administrator, and the researcher must cooperate. A dialogue is a beginning, but a team demonstration is the test. I, for one, hope that such fruitful collaboration comes about.

SUMMARY

Berthold Lowenfeld
Principal Investigator

I think there is very little that one can add after the detailed review of what has gone on here during two and one-half days. I was very pleased with the high level of presentations that we had by all those who were called upon to present their issues. I was particularly interested, of course, in the statistical research that has been carried on in Los Angeles by Dr. Parmelee, and here in Berkeley in the Public Health Department by Bill Williams. But I cannot continue and now review every single one who has made a contribution. I would just like to say "thank you" for your excellent presentations and for the most interesting way in which you gave us information about your research. I think, in general, it has been an example of how research can be presented without being tedious or boring; and for that we are greatly indebted to every single one of the persons who were called upon to present their issues on the program.

There are perhaps two points on which I would like to elaborate. They have not been touched directly at these meetings, except perhaps the first by Mrs. Sibert. First, we were not made to feel, at this conference, that research will solve all our problems - and this is to the credit of the conference. In so many conferences to which you come, you are impressed largely by the idea that, well, anything that hasn't been "researched" does not exist. This kind of undesirable spirit has been absent from this group. I would like to stress that in spite of all research efforts which have been made - and will be intensified by the money that is fortunately now available from federal resources - that in spite of all these efforts, we will have to rely for a long time, if not forever, on the teacher who understands children and the effects of blindness; on the teacher who has empathy with the children and knows how to give them opportunities from which they will not only gather knowledge and develop skills, but which will also strengthen the feelings which they have about themselves and about the world which surrounds them. The teacher is still the central person in our efforts to help blind children to become independent and to realize their ambitions later in life. This we will have to keep in mind and for this I'm going to plead again.

The other point was one that has to do with the fact that we had to recognize that none of our great state universities seems to have any commitment to conduct research in our field. We have had research presented here from some other universities, but not from one of the great California State Universities. In fact, I have lived next to the Berkeley Campus of the University of California, and the only attention which the university gives to special education and to the problems of handicapped children, youth, and adults, is one course - one overall course - in special education. When you talk with the people they tell you, well, this area is one with which the state colleges are concerned. On the other hand, however, they also stress that the state colleges are not here to do research. So, between these two points of view research is really shortchanged. The state universities are not conducting it, and the state colleges have to get it in by the back door. The state universities have been asking for grants and have received grants from various federal agencies by which they can conduct research in many fields, but not in special education, which is an area reserved for the state colleges.

I'm bringing this up here because I was painfully aware during the two and one-half days of our meetings that none of the state universities have been represented here with any research that they could present in the area with which we are concerned. We could widen it. None of the state universities could present any research either, if we include all the handicapped, because somehow they have not been interested in this field, although the handicapped constitute just as much a part of our citizenry as any other group of people do. I think the state universities in some other states and the private universities in some other states have established rehabilitation centers in which research is being done and service is being rendered. I refer to New York University; to the University of Minnesota; to the University of Washington; and to others which have received large grants from the Vocational Rehabilitation Administration to establish rehabilitation centers. There has been no move on the side of our state universities to do likewise. I think somehow, as citizens, we ought to put some pressure on them so that they will learn that this is a need which they must meet.

These are the two points which I thought I would bring up here, besides again saying thank you to all of those who have participated - I have gained a great deal from all the presentations that were made.

COMMENTS AND REACTIONS

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Since Dr. Graham has given a clear and concise summary of this conference I will briefly state some of my thoughts and reactions. We must keep in mind the point brought out by Dr. Scott and Dr. Parmelee that, even though we have provided educationally for the large wave of retrolental fibroplasia (RLF) children, there will still be blind and low-visioned children in need of special services. Mr. Simmons brought out the tremendous need for services for children having additional handicaps. Mr. Meyers estimated from the figures cited by Mr. Simmons that "26 percent of the blind in California under 18 years of age are in mental institutions." Many of us are very concerned about these children, realizing that their needs are great and services available are few. In California there are four child day care centers or pilot projects for multihandicapped children. Several blind children have been enrolled in these centers. In the northern part of the state two districts and one country had blind multihandicapped children in sufficient numbers to establish special classes for them. Several of these children, after two years of much individual attention, have returned to the resource teacher type of program for blind children. A few private schools are providing services for some of these children. While we have experienced some success in these special programs there is need for research to assist us in knowing how to best provide for the blind multihandicapped children.

The new eye report forms prepared by the National Society for Prevention of Blindness were mentioned. Many of you no doubt know that the states are required by federal law to annually report to the American Printing House for the Blind the number of legally blind children enrolled in public schools in kindergarten through grade twelve. At the same time the state of California requests information also concerning the partially seeing. Educators and the nurses seeking the requested information meet with considerable resistance from the medical profession in preparing these reports. It would appear that there is need for working more closely with the eye specialists in preparing these forms. We must find a better means of securing the information required without imposing an undue amount of work on the medical profession. Some system of national reporting using data processing methods would seem desirable.

Miss Kenyon had requested abstracts of the research recently completed or presently being performed. This would prove beneficial to many of us.

Conferences such as this should be continued; it would be helpful if, following the conference, we could have wide distribution of the *Proceedings* as a means of sharing this valuable information with teachers, parents, and school personnel.

We should encourage teachers to make greater use of the information presently available about adventitiously and congenitally blind children. Our methods of presenting information and of building concepts for these children may be due for reevaluation.

To date we have done very little in California with low vision aids. I liked Mrs. Sibert's suggestion of a traveling clinic making use of these aids.

Teachers and administrators will welcome the added information that is forthcoming from research concerning psychological evaluations.

We are all enthusiastic about orientation and mobility for students and will follow research and special projects with interest. Perhaps one of the next projects will include work with partially seeing students in orientation and mobility.

I want to thank Dr. Graham for making it possible for us to have a West Coast Regional Conference. This has been most beneficial.